Exhibit C

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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

ENTROPIC COMMUNICATIONS, LLC

Plaintiffs

v.

COX COMMUNICATIONS, INC., ET AL.

Defendants

ENTROPIC COMMUNICATIONS, LLC

Plaintiffs

v.

COMCAST CORPORATION, ET AL.

Defendants

CASE No.: 2:23-cv-01049-JWH-KES (Lead Case)
CASE No.: 2:23-cv-01050-JWH-KES (Related Case)

DEFENDANTS' PRELIMINARY INVALIDITY CONTENTIONS

Date Filed: 02/10/2023

Pursuant to the Court's Order Granting Stipulation Setting Claim Construction Schedule (-01049 Case, Dkt. 75 (Cox); -01050 Case, Dkt. 117 (Comcast)), Defendants Cox Communications, et al. ("Cox") and Comcast Corporation, et al. ("Comcast") (*collectively*, "Defendants[1]") hereby serve their Preliminary Invalidity Contentions and accompanying claim charts (collectively, "Preliminary Invalidity Contentions") concerning U.S. Patent Nos. 8,223,775 (the "'775 Patent"), 8,284,690 (the "'690 Patent"), 8,792,008 (the "'008 Patent"), 9,210,362 (the "'362 Patent"), 9,825,826 (the "'826 Patent"), 10,135,682 (the "'682 Patent"), 11,381,866 (the "'866 Patent"), and 11,399,206 (the "'206 Patent") (collectively, the "Patents-in-Suit or "Asserted Patents"). Each of the claims asserted by Plaintiff Entropic Communications, LLC ("Plaintiff" or "Entropic") are invalid under 35 U.S.C. §§ 102, 103, and/or 112[2] for at least the reasons disclosed herein. Plaintiff alleged infringement of the above-mentioned patents in its Original Complaint dated February 10, 2023. Plaintiff served a First Amended Complaint ("FAC") on June 5, 2023. On September 15, 2023, Plaintiff revised its contentions and served its Infringement Contentions and accompanying Document Production.

In its Infringement Contentions, Entropic has identified the following claims as asserted in this matter (collectively, "Asserted Claims") against Defendants:

Asserted Patents	**Asserted Claims**
U.S. Patent 8,223,775 (the "'775 Patent")	18 and 19
U.S. Patent 8,284,690 (the "'690 Patent")[3]	7 and 8

[1] The parties have entered a stipulated protective order 2:23-cv-01049, Dkt. 105 (Cox) and Dkt. 106 (Comcast).

[2] The parties understand that Section 101 invalidity will be addressed through motion practice.

[3] Entropic does not assert independent claim 1. Defendants' Invalidity Contentions address independent claim 1 because asserted claims 7 and 8 depend from independent claim 1.

U.S. Patent 8,792,008 (the "'008 Patent")	1-6, and 9-10
U.S. Patent 9,210,362 (the "'362 Patent")	11 and 12
U.S. Patent 9,825,826 (the "'826 Patent")	1-4, 6, and 8-9
U.S. Patent 10,135,682 (the "'682 Patent")	1-4, 5, and 9
U.S. Patent 11,381,866 (the "'866 Patent")	27-28, 33, 36-37, 41-42, 47, 50, and 51
U.S. Patent 11,399,206 (the "'206 Patent")	13-14, 19, 21, 23, 25-26, 31, 34, 35, 38-39, 44, 47, and 48

Defendants take no position with respect to any claims that are not asserted against Defendants and reserve the right to supplement these Preliminary Invalidity Contentions should the Court permit Entropic to assert new claims against Defendants.

Defendants' Preliminary Invalidity Contentions are not an admission that any accused products or components identified by Entropic in its Infringement Contentions, including any current or past version of those products or components, are covered by, or infringe the asserted claims, particularly when these claims are properly construed and applied.

A number of prior art references are cited herein and in accompanying exhibits, including Exhibits M-1 to M-14; Exhibits N-1 to N-29; Exhibits O-1 to O-29; Exhibits P-1 to P-12; Exhibits Q-1 to Q-17; Exhibits R-1 to R-17; Exhibits S-1 to S-14; Exhibits T-1 to T-29; and Exhibit QQ (collectively, "Accompanying Exhibits") demonstrating how the various claim elements were disclosed or rendered obvious by the prior art and also as evidence of the description of the industry at the relevant time. The prior art references referred to are exemplary only. Defendants' search for prior art references, additional documentation, and/or corroborating evidence concerning prior art systems and devices is ongoing. Accordingly, Defendants reserve the right to modify, amend, or otherwise supplement its Preliminary Invalidity Contentions as Defendants obtains

additional prior art references, documentation, and/or corroborating evidence concerning invalidity during the course of discovery.

I. RESERVATIONS

A. General Reservations

Defendants incorporate by reference any and all other bases for invalidity identified during prosecution, *inter partes* review, *ex parte* reexamination, or any other proceeding that has been before[4] or comes before the United States Patent and Trademark Office ("USPTO") or foreign patent office regarding the Patents-in-Suit or any other patents in the same families as the Patents-in Suit. Defendants additionally incorporate by reference any and all other invalidity contentions, invalidity opinions, or invalidity testimony (including demonstratives) that have been or will be served in this case or any other case brought by or against Entropic and/or involving any of the Patents-in-Suit, including:

- *Entropic Communications, LLC v. Charter Communications, Inc. et al.,* 2-22-cv-00125 (E.D. TX)
- *Entropic Communications, LLC v. Charter Communications, Inc.,* 2-23-cv-00050 (E.D. TX);
- *Entropic Communications, LLC v. Charter Communications, Inc.,* 2-23-cv-00051 (E.D. TX);
- *Entropic Communications, LLC v. Charter Communications, Inc.,* 2-23-cv-00052 (E.D. TX);
- *Entropic Communications, LLC v. Dish Network Corp. et al.*, 2:23-cv-01043-JWH-KES (C.D. Cal.) (Lead Case)

[4] By way of example, Defendants incorporate by reference all petitions and related exhibits for Inter Partes review relating to the '008 Patent (DISH Network Corporation et al v. Entropic Communications, LLC, IPR2023-00393 (PTAB)). Similarly, Defendants incorporate by reference all documents and related exhibits relating to ex parte reexamination of the '362 patent, Control No. 90/019,255, filed by requestor Unified Patents.

- *Entropic Communications, LLC v. Cox Communications, Inc. et al.*, 2:23-cv-01047-JWH-KES (C.D. Cal)
- *Entropic Communications, LLC v. Comcast Corporation et al.*, 2:23-cv-01048-JWH-KES (C.D. Cal.)
- *Entropic Communications, LLC v. Cox Communications, Inc. et al.*, 2:23-cv-01049-JWH-KES (C.D. Cal) (Lead Case)
- *Entropic Communications, LLC v. Comcast Corporation et al.*, 2:23-cv-01050-JWH-KES (C.D. Cal.)
- *Entropic Communications, LLC v. DirecTV, LLC f/k/a DirecTV, Inc. et al.,* 2-22-cv-00075 (E.D. TX)
- *Entropic Communications, LLC v. Dish Network Corporation et al.,* 2-22-cv-00076 (E.D. TX)
- *Entropic Communications, LLC v. Dish Network Corp. et al.,* 2-22-cv-07959 (C.D. Cal.)
- *Entropic Communications, LLC v. DirecTV, LLC et al.,* 2-22-cv-07775 (C.D. Cal.)

In addition, Defendants incorporate herein all statements made by the applicants of the Patents-in-Suit or their attorneys/representatives, during prosecution of the Patents-in-Suit and any patents related to the Patents-in-Suit characterizing the state of the art, the prior art, or the basis of distinguishing any invention over the state of the art or prior art. Similarly, Defendants also incorporate statements about the state of the art, prior art, or the basis of distinguishing any invention over the state of the art or prior art made by the USPTO during prosecution or any post-grant proceeding. Defendants intend to amend these contentions to address any positions taken by Entropic (for example, in its Infringement Contentions or Claim Construction proceedings) that differ from positions taken by the patentees during prosecution, post-grant proceedings, or any parallel or prior litigation, and reserve all rights accordingly.

B. Ongoing Discovery

Defendants disclose these Preliminary Invalidity Contentions based on its current knowledge and understanding of the prior art as of the date of these Preliminary Invalidity Contentions. Discovery is ongoing, and Defendants' prior art investigation is not yet complete. Furthermore, Defendants' investigation of and discovery from potentially relevant third parties is not yet complete. Additional discovery and investigation, including but not limited to production of relevant additional materials from Entropic and predecessor-in-interest to the Asserted Patents MaxLinear[5], the named inventors on the Patents-in-Suit, the prosecuting attorneys, and Broadcom (whose products are accused) and other third-party, may lead to additions to, changes in, or modifications of these Preliminary Invalidity Contentions.

Claim construction proceedings for this action have not yet occurred. Accordingly, Defendants' Invalidity Contentions are made without the benefit of Entropic's claim construction positions, claim construction discovery, expert discovery, or any claim construction opinion or order by the Court in this action. Entropic has not produced all prior art materials in its possession and/or control, including certain invalidity-related materials from prior cases requested by Defendants such as prior art. For example, Entropic has failed to produce expert depositions related to any litigations involving the Asserted Patents. Entropic's production of those materials may lead to additions to, changes in, or modifications of these Preliminary Invalidity Contentions. Nor have Defendants had the opportunity to depose Entropic regarding the notes, records, reports or similar materials prepared in conjunction with the supposed

[5] MaxLinear acquired Entropic Communications in 2015. *See generally* https://www.sec.gov/Archives/edgar/data/1288469/000119312515172042/d918886d8k.htm and https://www.globenewswire.com/news-release/2015/04/30/731087/10131981/en/MaxLinear-Completes-Acquisition-of-Entropic.html

invention's conception and reduction to practice. As such, Defendants reserve the right to revise, amend, and/or supplement the information provided herein, including identifying, charting, and relying on additional references or combinations of references.

These Preliminary Invalidity Contentions, therefore, are provided without prejudice to Defendants' rights to revise, amend, correct, supplement, modify, or clarify their Preliminary Invalidity Contentions. Defendants also reserve the right to complete their investigation and discovery of the facts, to produce subsequently discovered information, and to introduce such subsequently discovered information at the time of any hearing or trial in this action.

C. Claim Construction

Unless otherwise stated herein, Defendants take no position on any matter of claim construction in these Preliminary Invalidity Contentions. Defendants reserve the right to propose any claim construction they consider appropriate and to contest any claim construction they consider inappropriate. Without conceding any express or implied claim construction, Defendants have attempted to apply the Asserted Claims to the prior art in view of the Asserted Patents and File Histories and Defendants' understanding of Entropic's Infringement Contentions.

Defendants also reserve the right to argue that certain claim terms, phrases, and elements are indefinite, lack written description, are not enabled, and/or are otherwise invalid under 35 U.S.C. § 112, as exemplified below. Defendants also reserve the right to propose alternative constructions to those advanced by Entropic and to rebut Entropic's actual claim construction positions. Defendants further reserve the right to modify, amend, and/or supplement these Preliminary Invalidity Contentions in accordance with the claim construction rulings from the Court. Defendants further reserve the right to modify, amend, and/or supplement these Preliminary Invalidity Contentions in response to any claim construction or interpretation positions that Entropic may take in this case, or other cases concerning the Asserted Patents or patents

relating to the Asserted Patents, including any infringement and/or additional claim construction positions Plaintiff may take. Defendants further reserve the right to modify, amend, and/or supplement these Preliminary Invalidity Contentions in response to any allegedly supporting evidence offered by Plaintiff, or any report from any expert witness for Plaintiff regarding claim construction, infringement, or validity issues raised in this case, or other cases concerning the Asserted Patents or patents relating to the Asserted Patents.

Defendants make these Preliminary Invalidity Contentions to the extent they have been able to understand or ascertain Entropic's apparent constructions of the Asserted Claims of the Patents-in-suit from Plaintiff's Infringement Contentions. In some instances, Plaintiff's Infringement Contentions contradict the disclosures in the Patents-in-suit, contradict the understanding of the claim terms by a person of ordinary skill in the art, and are vague and conclusory concerning how the claim limitations supposedly read on the accused products.

Nothing herein should be construed as an admission that Defendants agree with Entropic's apparent claim constructions or that Entropic's Infringement Contentions are legally sufficient. By including prior art that is anticipatory or renders obvious claims based on the constructions apparently applied by Plaintiff to the claims, Defendants' Preliminary Invalidity Contentions are not—and should not be interpreted as—adoptions or admissions to any of Entropic's apparent construction. Defendants do not agree with Entropic's application of the claims and denies infringement. Furthermore, Defendants object to any attempt to imply claim construction from the accompanying claim charts and obviousness chart identified in the Accompanying Exhibits.

Defendants reserve the right to argue that the preambles are or are not limitations during the claim construction proceedings in this litigation. Moreover, Defendants reserve the right to argue that any claim elements of the Asserted Claims do not in fact limit the scope of the Asserted Claims.

D. Insufficiency of Entropic's Infringement Contentions

Defendants' Preliminary Invalidity Contentions are limited by the information provided by Entropic in its Infringement Contentions, which do not fully articulate the particular instrumentalities, components, or features that are alleged to correspond to the claimed system elements or perform the claimed method steps (and in most cases, do not reference any particular instrumentality at all). Entropic's Infringement Contentions are also overly broad, vague, and ambiguous. Thus, Entropic's insufficient Infringement Contentions have impeded Defendants' abilities to determine the full scope and basis of Entropic's infringement allegations and to determine the scope of the invalidating prior art.

Defendants incorporate by reference any and all other bases for insufficiency of Entropic's Infringement Contentions, including but not limited to Comcast's letter to Special Master David Keyzer re Deficient Infringement Contentions, dated October 18, 2023, and Cox's letter to Special Master David Keyzer re Deficient Infringement Contentions, dated November 17, 2023. The Special Master "expressed that amending the infringement contentions will be necessary" with respect to at least the infringement contentions for Comcast but did not set a deadline for amendment. Dkt. 119-1 at 11.

Defendants reserve the right to supplement or amend their Preliminary Invalidity Contentions if Entropic amends its Infringement Contentions to identify any such instrumentalities, components, or features, or to take a claim construction position, or for any other reason constituting good cause to modify, amend, supplement or otherwise alter these Preliminary Invalidity Contentions. A non-exhaustive list of deficiencies in Entropic's infringement contentions is listed below:

1. The '775 patent

Claim 18 of the '775 patent recites a "DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost

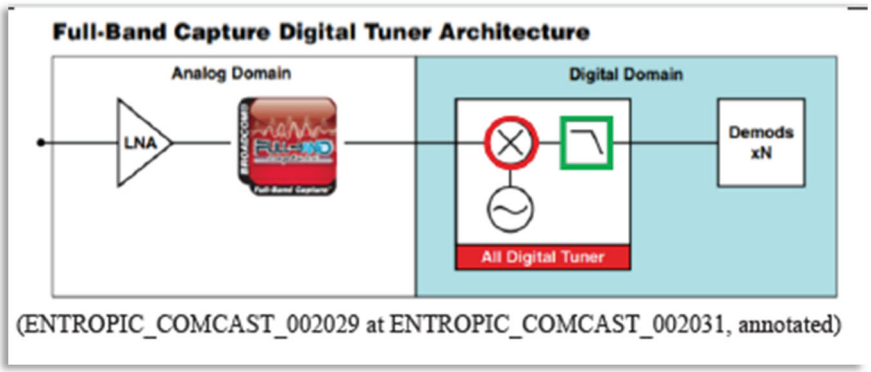
downstream throughput." Infr. Cont., Ex. A at 5[6]. While Entropic alleges that all of these components are in a Broadcom SoC, Entropic does not identify what it contends is the DOCSIS MAC processor or the DOCSIS controller within that SoC. Instead, it simply alleges that such components exist "on information and belief." *Id*. Entropic must identify what it contends is the "DOCSIS MAC processor" and the "DOCSIS controller" and why it contends that "downstream PDU packets [are] forward[ed] . . . directly to the data networking engine without the involvement of the DOCSIS controller." To the extent Entropic is unable to identify these components in the Accused Instrumentalities, it should withdraw its assertion of this patent.

Claim 18 of the '775 patent further recites "connecting, via a data bus, the data networking engine to the cable modem engine." Entropic's Infringement Contentions state that "[t]he multi-threaded applications processor provides the data networking engine and the cable modem CPU provides the cable modem engine," and then summarily states that "[t]he cable modem CPU communicates with the multi-threaded applications processor using a data bus." *See* Infr. Cont., Ex. A at 7. Entropic fails to identify any alleged "data bus" in any of the cited documents, or what Entropic contends constitutes the data bus. During the meet and confer, Entropic declined to provide additional details regarding what it contends is the "data bus" in the accused Broadcom SoCs, but insisted that a data bus between the cable modem CPU and multi-threaded processor was inherent to those devices. In subsequent correspondence, Entropic disavowed this inherency position. More remarkably, Entropic stated that Broadcom chips are not accused, directly contradicting its infringement contentions. To the extent Entropic is unable to identify the "data bus" in the Accused Instrumentalities, it should withdraw its assertion of this patent.

[6] Citations to infringement contentions refer to the infringement contentions served on Comcast.

2. The '362 / '206 / '866 patents

Entropic's charts for the claims of the '362, '206, and '866 patents are missing critical details regarding Entropic's allegations. For example, claim 11 of the '362 patent, which is the sole charted independent claim, recites "downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies that comprises a plurality of desired television channels and a plurality of undesired television channels." Entropic's infringement contentions contain the following figure, in which it contends "mixer module" (red) and "filter" (green) are "used to frequency shift (i.e., downconvert) the digitized QAM channels in the composite broadband signal from a higher frequency to a lower frequency." Infr. Cont., Ex. D at 5-6. Entropic cites the same figure for the "digital down converter" ('866 patent) and "digitally down converting" ('206 patent). *See* Infr. Cont., Ex. G at 14-15; Infr. Cont., Ex. H at 5-6, 24-26. During the meet and confer, Entropic declined to explain what it meant by this "frequency shift (i.e., downconvert)."



(ENTROPIC_COMCAST_002029 at ENTROPIC_COMCAST_002031, annotated)

In addition, claim 13 of the '206 patent recites "providing the plurality of digital channel outputs via a serial interface." *See* Infr. Cont., Ex. H at 6-7, 19, 29. Entropic's infringement contentions fail to identify what it contends is the "serial interface," or why it believes the accused Broadcom SoCs have a "serial interface," but instead makes this allegation "based on information and belief." Entropic has already issued expert reports on alleged infringement of these claims by Broadcom SoCs in parallel litigation against Charter, and is set to present those allegations at trial in December. It is

implausible that Entropic's claim is solely based on information and belief, and Entropic should provide its true infringement contentions. To the extent Entropic is unable to do so, it should withdraw its assertion of this patent.

3. The '826 patent

Claim 1 of the '826 patent, Entropic's sole charted independent claim, recites "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages." Entropic provides no basis to satisfy this limitation, and simply parrots the claim language alleging that "the Technicolor CGM4140, using its applicable circuity and/or software modules, is operable to control the transmission of network management messages based on the measured characteristics." The Special Master "expressed particular concern regarding the sufficiency of the contentions as to the 'network management message.'" Dkt. 119-1 at 11. To the extent Entropic is unable to identify the "network management message" in the Accused Instrumentalities, it should withdraw its assertion of this patent.

4. The '008 patent

Entropic's charted claims recites a "channelizer." Entropic points to the BCM33843 for this component, without any explanation of what portion or function within the chip allegedly satisfies this component. *See* Infr. Cont., Ex. C at 2, 4, 8, 9; *see also id.* at 15, 19, 21 (claim 3). To the extent Entropic is unable to identify the "channelizer" in the Accused Instrumentalities, it should withdraw its assertion of this patent.

E. Rebuttal Evidence

Additional prior art, whether known or not known to Defendants as of the date of these contentions, may become relevant depending on Entropic's arguments regarding the scope of the disclosure of the prior art identified herein. To the extent that such an issue arises, Defendants reserve the right to supplement these Preliminary Invalidity

Contentions to address Entropic's arguments or challenges, and to identify other references that would anticipate or render obvious the allegedly missing limitation(s).

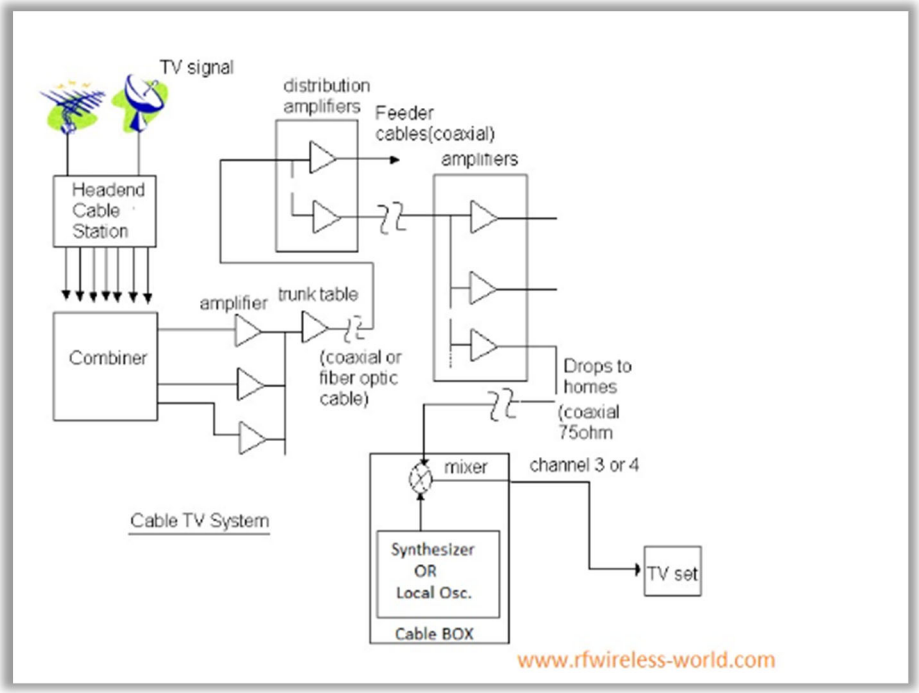
F. Background

Techniques and structures for cable television have been well-known and conventional in the art for decades. Many of these techniques and structures have been defined in various standards, including the Data Over Cable Service Interface Specifications (DOCSIS), the 802.11 standard for wireless networking, various versions of the MoCA MAC/PHY Specification, or have been long-known in the electronic industry. As explained below, many of these well-known and conventional techniques and structures were incorporated into existing standards and devices for use in set-top boxes, cable modems, and other devices at customer premises and at equipment at the cable company's local distribution facility (a/k/a the "head-end equipment"), producing predictable results.

1. Cable TV System

The Cable TV system is a long-known system of delivering television programming and data to consumers via radio frequency (RF) signals transmitted via coaxial cables or fiber-optic cables. A cable channel (sometimes known as a cable network) is a television network available via cable television. Many of the same channels are distributed through satellite television. *Id*.

A cable television headend is a master facility for receiving television signals for processing and distribution over a cable television system.



See, *e.g.*, https://www.rfwireless-world.com/Tutorials/cable-TV-basics.html.

(a) The 802.11 Standards

The "most successful wireless networking technology" of its time—802.11—was first standardized in 1997, with various subsequent upgrades. *See* M. Gast, "802.11® Wireless Networks: The Definitive Guide," O'Reilly & Associates (April 2002) ("Gast") at Ch. 1. After its release in 1997, the 802.11 standard evolved rapidly, with major updates released by 1999, as illustrated in the following table:

Table 1-2. Comparison of 802.11 standards			
IEEE standard	**Speed**	**Frequency band**	**Notes**
802.11	1 Mbps 2 Mbps	2.4 GHz	First standard (1997). Featured both frequency-hopping and direct-sequence modulation techniques.
802.11a	up to 54 Mbps	5 GHz	Second standard (1999), but products not released until late 2000.
802.11b	5.5 Mbps 11 Mbps	2.4 GHz	Third standard, but second wave of products. The most common 802.11 equipment as this book was written.
802.11g	up to 54 Mbps	2.4 GHz	Not yet standardized.

Id. at Table 1-2.

Accordingly, 802.11 networks were well developed by 1999, and the market for 802.11-compatible equipment exploded due to its affordability. *Id*. at Ch. 1.2. By 2002, 802.11 went by a variety of names, e.g., Wi-Fi, 802.11, and even "802.11 *wireless Ethernet,*" which is intended to emphasize its shared lineage with traditional wired Ethernet (802.3). *Id*. However, to account for the differences between wired and wireless media used by 802.11, additional features were added. *Id*. at Ch. 2. At the heart of 802.11 is the use of MAC addresses. As Gast explains:

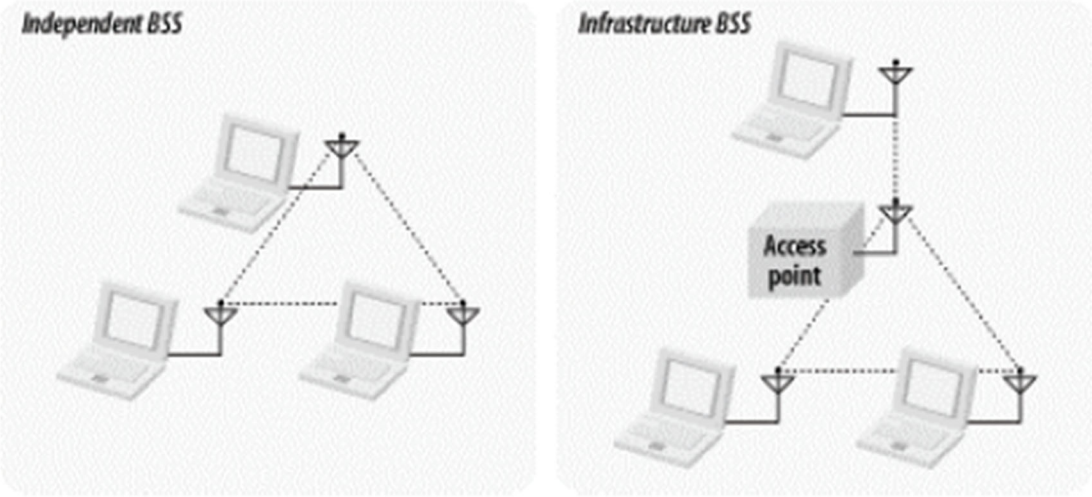
> Wireless network interface cards are assigned 48-bit MAC addresses, and, for all practical purposes, they look like Ethernet network interface cards. In fact, the MAC address assignment is done from the same address pool so that 802.11 cards have unique addresses even when deployed into a network with wired Ethernet stations.

Id.

The Basic Service Set or "BSS" for short, is described as the basic building block of an 802.11 network. Essentially, this means a set of stations that communicate with each other within an area. These can typically be divided into independent (the stations

communicate directly with each other) and infrastructure BSSs (distinguished by use of an access point), as shown below.

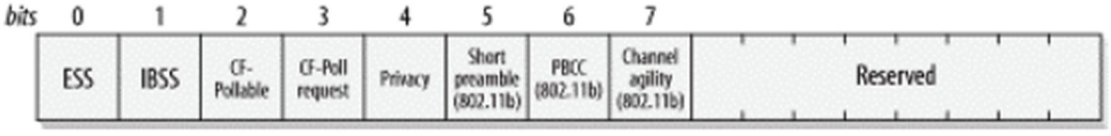
Figure 2-4. Independent and infrastructure BSSs



Id. at Fig. 2-4.

To get on a network, 802.11 uses a "Beacon" process. "Beacon transmissions announce the existence of an 802.11 network at regular intervals. Beacon frames carry information about the BSS parameters and the frames buffered by access points, so mobile stations must listen to Beacons." *Id.* at 4.3.2.3. A 16-bit "Capability Information Field" is shown below; it is used in Beacon transmissions, which advertise a network's capabilities; such information is also used in Probe Requests and Probe Response frames. *See id.* at 4.3.2.4.

Figure 4-24. Capability Information field



Id. at Fig. 4-24.

Other information is also relayed in 802.11 systems, such as timestamps for synchronization between stations in a BSS and/or service set identity (SSID) information, as shown in the Figures below. *See id*.

Figure 4-28. Timestamp field

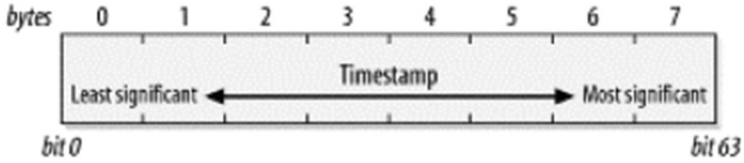


Figure 4-32. Service Set Identity information element

Id. at Figs. 4-28 and 4-32.

Notably, wireless devices are constrained to operate in a certain "frequency band." To prevent overlapping uses of radio waves, frequency is allocated in such bands, i.e., a range of frequencies available for specified applications. *Id*. at 1.1.1. Common U.S. frequency bands are shown below. 802.11 devices operate within the ISM bands. *Id*. at 1.1.1.1.

Table 1-1. Common U.S. frequency bands

Band	Frequency range
UHF ISM	902-928 MHz
S-Band	2-4 GHz
S-Band ISM	2.4-2.5 GHz

Table 1-1. Common U.S. frequency bands	
Band	**Frequency range**
C-Band	4-8 GHz
C-Band satellite downlink	3.7-4.2 GHz
C-Band Radar (weather)	5.25-5.925 GHz
C-Band ISM	5.725-5.875 GHz
C-Band satellite uplink	5.925-6.425 GHz
X-Band	8-12 GHz
X-Band Radar (police/weather)	8.5-10.55 GHz
Ku-Band	12-18 GHz
Ku-Band Radar (police)	13.4-14 GHz 15.7-17.7 GHz

Id. at Table 1-1.

After 802.11's release in 1999, the IEEE 802.11 working group quickly began working on faster radio layers and standardized both 802.11a and 802.11b in 1999. In particular, "802.11a uses a radio technique called *orthogonal frequency division multiplexing* (OFDM). 802.11a operates in a different frequency band entirely and currently has regulatory approval only in the United States." *Id*. at 1.2. OFDM has some similarities to techniques in related fields. OFDM divides an available channel into subchannels and encodes a portion of the signal across each of the subchannels in parallel. *See, e.g., id.* at 9.2.2.1. This is similar to a technique called the "Discrete Multi-Tone (DMT)" which is used by some DSL modems. *See, id*. As discussed in § II.B *infra*, the OFDM technique predated 802.11 by decades.

(b) The DOCSIS Specifications

DOCSIS, short for "Data Over Cable Service Interface Specification," developed by Cable Television Laboratories (CableLabs) has been around since 1997 for providing high-speed data-over-cable systems. The first-released version of DOCSIS was DOCSIS 1.0. *See* https://en.wikipedia.org/wiki/DOCSIS. DOCSIS versions 1.1, 2.0, 3.0, and 3.1 were released in 1999, 2001, 2006, and 2013 respectively. *See id*.

DOCSIS 3.0 significantly increased data rates (both upstream and downstream) and introduced support for Internet Protocol version 6 (IPv6). *See id*. The biggest improvement from DOCSIS 2.0 is that 3.0 and 3.1 allow channel bonding, which allows two channels (or more) to be used as the download or the upload channel. A high-level network architecture of DOCSIS is shown below:

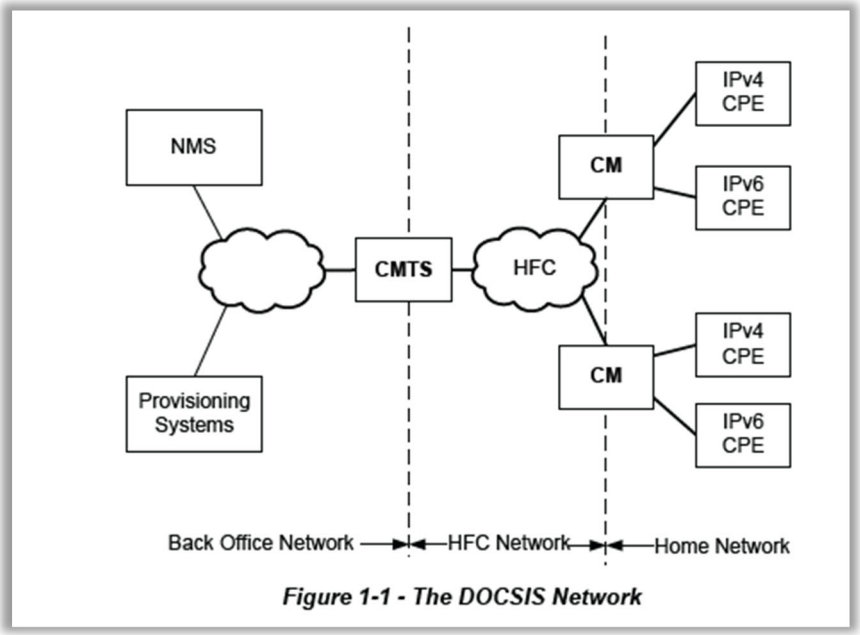


Figure 1-1 - The DOCSIS Network

DOCSIS 3.0 Physical Layer Specification at Figure 1-1.

The CM connects to the operator's HFC network to a home network, bridging packets between them. Many CPE devices can connect to the CM's LAN interfaces. CPE devices can be embedded with the CM in a single device, or they can be separate standalone devices, as shown in the above figure. CPE devices may use IPv4, IPv6 or both forms of IP addressing. Examples of typical CPE devices are home routers, set-top devices, personal computers, etc. The CMTS connects the operator's back office and core network with the HFC network. Its main function is to forward packets between these two domains, and between upstream and downstream channels on the HFC network. *See generally* DOCSIS 3.0 Physical Layer Specification, issued December 22, 2006.

DOCSIS provides a MAC-layer transport service, termed "Service Flow." DOCSIS modems provide QoS through the notion of Service Flows: A Service Flow is a unidirectional flow of packets that are guaranteed a particular bandwidth, which the flow requested at the time it was set up. Service Flows are identified by a 32-bit Service Flow Identifier (SFID) assigned by the CMTS. Each active upstream Service Flow also has a unique 14-bit SID.

7.5 Quality of Service

7.5.1 Concepts

7.5.1.1 Service Flows

A Service Flow is a MAC-layer transport service that provides unidirectional transport of packets either to upstream packets transmitted by the CM or to downstream packets transmitted by the CMTS[10]. A Service Flow is characterized by a set of QoS Parameters such as latency, jitter, and throughput assurances. In order to standardize operation between the CM and CMTS, these attributes include details of how the CM requests upstream mini-slots and the expected behavior of the CMTS upstream scheduler.

DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification at 236.

Service Identifier (SID)	A Service Flow Identifier assigned by the CMTS (in addition to a Service Flow Identifier) to an Active or Admitted Upstream Service Flow. [14 bits] (SID).

DOCSIS 3.0 Physical Layer Specification at 14. DOCSIS also provides a "Group Service Flow" functionality.

- **Source-Specific Multicast:** DOCSIS 3.0 supports delivery of Source-Specific IP Multicast streams to CPEs. Rather than extend the IP multicast protocol awareness of cable modems to support enhanced multicast control protocols, DOCSIS 3.0 takes a different approach. All awareness of IP multicast is moved to the CMTS, and a new DOCSIS-specific layer 2 multicast control protocol between the CM and CMTS is defined which works in harmony with downstream channel bonding and allows efficient and extensible support for future multicast applications.
- **Multicast QoS:** DOCSIS 3.0 defines a standard mechanism for configuring the Quality of Service for IP multicast sessions. It introduces the concept of a "Group Service Flow" for multicast traffic that references a Service Class Name that defines the QoS parameters for the service flow.

See DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification at 50.

Group Service Flow	Group Service Flow, a downstream Service Flow for packets forwarded to hosts reached through a group of Cable Modems. A GSF may be either a Bonded GSF (B-GSF) or a Non-Bonded GSF (NB-GSF).

See DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification at 15.

The creation of a Service Flow may be initiated either by the CM or by the CMTS. The mechanism used is a three-way handshake of MAC messages known as a Dynamic

Service Addition: DSA-Request, DSA-Response and DSA-Acknowledge. Changes to an existing Service Flow are made through a similar series of Dynamic Service Change messages, and deletions of Service Flows occur through a two-way handshake of DSD-Request and DSD-Response. Illustrated below are examples of CM-initiated and CMTS-initiated Service Flows.

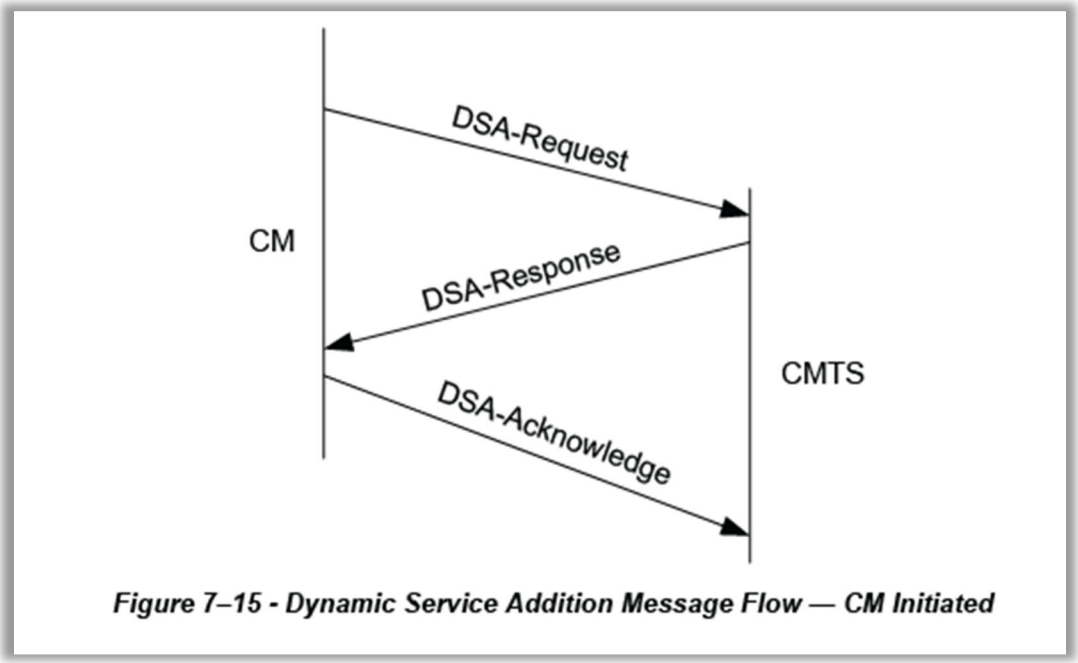


Figure 7–15 - Dynamic Service Addition Message Flow — CM Initiated

See DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification at Figure 7-15.

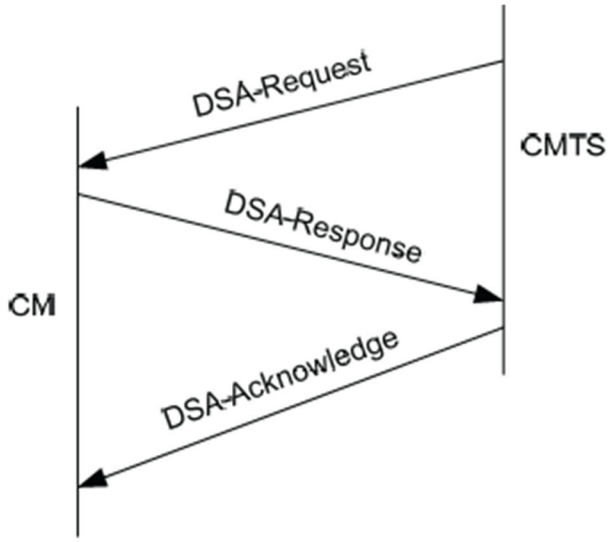


Figure 7–16 - Dynamic Service Addition Message Flow — CMTS Initiated

See DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification at Figure 7-16.

7.5.1.1 Service Flows

A Service Flow is a MAC-layer transport service that provides unidirectional transport of packets either to upstream packets transmitted by the CM or to downstream packets transmitted by the CMTS[10]. A Service Flow is characterized by a set of QoS Parameters such as latency, jitter, and throughput assurances. In order to standardize operation between the CM and CMTS, these attributes include details of how the CM requests upstream mini-slots and the expected behavior of the CMTS upstream scheduler.

A Service Flow is partially characterized by the following attributes[11]:

ServiceFlowID: exists for all service flows

SID Cluster Group: defines the set of SID Clusters assigned to a service flow. It only exists for admitted or active upstream service flows.

DOCSIS 3.0 also discloses "SID Cluster Group" associated with Service Flows. *See* DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification I18 at pg. 207-208.

In order to provide maximum flexibility in SID assignment on upstream channels, a new term, SID Cluster, is used to define a group of SIDs that contains one SID for each upstream channel associated with a particular Service Flow that is treated the same from a request/grant perspective. An example SID Cluster is shown in the table below.

Table 7–3 – Example SID Cluster

SID Cluster	US#1 SID	US#2 SID	US#3 SID	US#4 SID
Cluster_0	58	479	85	1001

A SID Cluster is assigned to a specific service flow on a CM. Whenever the service flow uses a SID Cluster to make a request, the CM MUST use the SID appropriate for the upstream channel on which it is transmitting the request. In the example configuration above, the CM would use SID 479 when sending a bandwidth request on upstream #2. Similarly, whenever the CMTS grants a request that is part of a SID Cluster, it MUST grant the request using the SID corresponding to that SID Cluster on the selected upstream channel. In the example given earlier, if the CMTS chose to use US#3 to grant the request from SID 479 on US#2, the CMTS would place a grant to SID 85 in the MAP for US#3.

See DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification I18 at pg. 179.

DOCSIS 3.0 discloses that CMs report a Receive Channel Profile describing the CM's downstream physical layer.

8.2.4 Cable Modem Physical Receive Channel Configuration

A Cable Modem reports its ability to receive multiple channels with one or more Receive Channel Profile (RCP) Encodings in a REG-REQ or REG-REQ-MP message. Each Receive Channel Profile describes a logical representation of the CM's downstream physical layer in terms of Receive Channels (RCs) and Receive Modules (RMs). The CMTS initially configures a CM's Receive Channels and Receive Modules with a Receive Channel Configuration (RCC) Encoding in the REG-RSP or REG-RSP-MP Message. This section defines the applicable terms and outlines the mechanism by which this process takes place.

8.2.4.1 Receive Channels

The term "Receive Channel" refers to the component of a Cable Modem that receives a single Downstream Channel on a single center frequency. A CM is considered to implement a fixed number of Receive Channels, each of which

See DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification I18 at pg 254-255.

DOCSIS 3.0 provides a Proactive Network Maintenance (PNM) capability, which includes pre-equalization in the upstream portion of the cable TV network. This would "help cable operators and industry vendors implement smart monitoring tools, improve maintenance practices, gain better insight in network problems, and enhance network reliability, among other things." *See* DOCSIS Best Practices and Guidelines, Proactive Network Maintenance Using Pre-equalization, CM-GL-PNMP-V01-100415, released April 15, 2010 ("DOCSIS PNM Guide 2010"). DOCSIS PNM Guide 2010

at 9. "In most scenarios, upstream pre-equalization mechanisms can completely compensate for certain problems in the network and no symptoms are detected in FEC statistics or through other metrics. The fact that equalization can fully compensate for network linear distortion can buy the operator time in resolving the issue before there is service impact, thus enabling a proactive network maintenance strategy." *Id*. at 19. "The upstream pre-equalization mechanism relies on the interactions of the DOCSIS ranging process in order to determine and adjust the CM pre-equalization coefficients. The intent is for the CM to use its coefficients to predistort the upstream signal such that the pre-distortion equals the approximate inverse of the upstream path distortion, so that as the pre-distorted upstream signal travels through the network it is corrected and arrives free of distortion at the upstream receiver at the CMTS. The pre-equalization coefficients of the CM are the complex coefficients (F1 through F24) of the 24-tap linear transversal filter structure shown in Figure 4." *Id*. at 23-24.

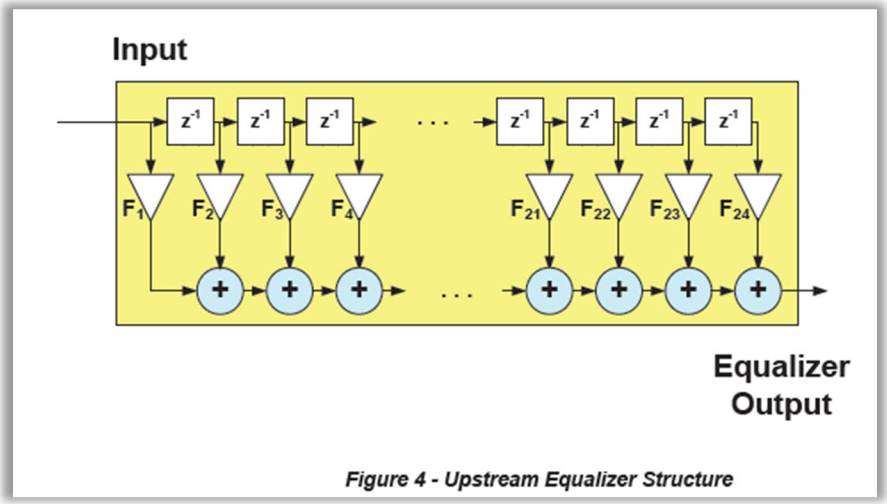


Figure 4 - Upstream Equalizer Structure

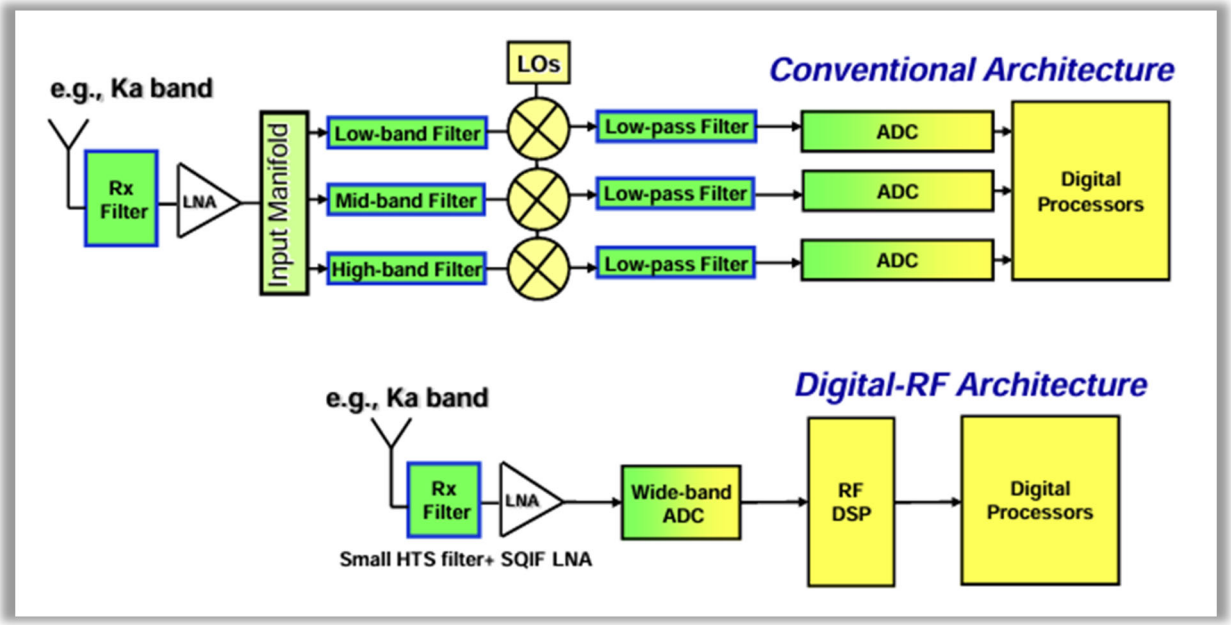
2. Wideband Tuning Analog-to-Digital Converters

As early as the 1990s, rapid technological progress in wireless commercial and defense communications and related radar and electronic-warfare applications drove the demand for much higher analog-to-digital converter (ADC) performance. *See*, *e.g.*, the article "History of Superconductor Analog-to-Digital Converters," in 100 Years of Superconductivity," O. A. Mukhanov et al., published 2011, available at

https://xdevs.com/doc/_Metrology/ADC-History-Ch7.8_100yearsSC.pdf at 11-12. These applications could greatly benefit from the ability to directly digitize wideband RF signals. *Id.* But conventional narrow-band technology implemented a separate, typically low-speed, analog receiver with one or more downconversion steps for digitizing each sub-band. *Id.*

Stacking multiple digital tuners to implement a wideband digital receiver was well-known in the prior art. For example, U.S. Pat. No. 5,590,156, titled "Multichannel wideband digital receiver making use of multiple wideband tuners having individually selectable gains to extend overall system dynamic range" ("Carney '156"), which issued Dec. 31, 1996, teaches using multiple digital tuner sections and multiple channelizers to implement a wideband digital receiver. *See, e.g.*, Carney '156 patent, Fig. 1. "[T]he channelizers 16 [shown in Fig. 1] may make use of a digital integrated circuit which accepts a wideband digital input and provides a downconverted output, such as HSP 50016 Digital Downconverter sold by Harris Semiconductor, Inc., of Palm Bay, Fla." '156 patent, 11:16-21. "In another embodiment, the multiple digital tuner sections need not each service the same bandwidth, but rather may each be dedicated to covering a different proportion of the bandwidth serviced by the basestation. In particular, the relative sizes of the bandwidths covered by individual tuners are selected depending upon the expected distribution of the density of relatively strong signals and relatively weak signals. In the typical situation, where the subscriber units are more or less evenly distributed geographically, there usually are many more weaker signals than stronger signals to be serviced. This is because the received signal strength varies as an inverse exponential of the distance between the basestation and the subscriber unit." Carney '156, 4:7-19.

In a Digital-RF architecture, a wideband RF signal is applied directly to an ADC, which produces an oversampled low-bit-width digital code at a very high data rate (tens of Gbps). https://xdevs.com/doc/_Metrology/ADC-History-Ch7.8_100yearsSC.pdf at 11-12. This high-rate data stream is processed before down-conversion using a relatively low-complexity but very high throughput processor to implement various digital signal processing (DSP) functions. *Id.* Finally, this high-rate data is down-converted to baseband using digital mixers and decimation filters for further processing and decoding. *Id.*



Id.

Upon information and belief, Broadcom Inc. was one of the first companies involved in the design of wideband ADCs. An article published in 2006 indicates two Broadcom chipsets BCM1100 and BCM1190 including wideband ADCs and applicable for residential Ethernet Internet Protocol (IP) phone products. *See, e.g.*, https://datasheet.ciiva.com/3032/1100-pb04-r-3032916.pdf. https://download.siliconexpert.com/pdfs/2007/06/26/isys/brc/1190-pb02-r.pdf.

The handling of multiple channels for increased utility (e.g., picture-in-picture) as well as increased bandwidth and data communication rates has been long known,

including on cable networks. *See* U.S. Patent 7,565,680 ("Asmussen 680") at 32:45-56, Fig. 14; U.S. Patent 4,888,641 ("Isnardi 641"); (Inverse Multiplexing (1994) (Duncanson); "Multicarrier Modulation for Data Transmission: An Idea Whose Time Has Come" (1990) ("Bingham"); adding channels together to support high-definition television); U.S. Patent 6,473,418 ("Laroia 418").With the introduction of the latest DOCSIS 3.0 standard in 2006, the industry moved toward supporting devices that could support 160 Mbps or higher, and determining how to support multiple channels with a reduced number of tuners. To save on components and power, the industry moved towards the use of wideband tuners. *See*, *e.g.*, https://www.edn.com/tuners-for-docsis-3-0-cable-modems/. Upon information and belief, the tuner developed by the Broadcom engineers and proposed in this article was one of the earliest wideband direct conversion tuners for set-top boxes. *See* "An embedded 65 nm CMOS baseband IQ 48 MHz-1 GHz dual tuner for DOCSIS 3.0[7]," Francesco Gatta et al. ("Gatta"), published in the IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 44, NO. 12, DECEMBER 2009. The direct conversion tuner was applicable to DOCSIS 3.0 and set-top box applications and able to "down-convert a total of ten 6 MHz Annex B channels or eight 8 MHz Annex A channels, for a maximum data rate of 320 Mb/s in Annex B and 400 Mb/s in Annex A mode." *Id*. at 13.

One of the authors of the above-mentioned IEEE article, Leonard Dauphinee, is also listed as a named inventor of U.S. Patent No. 7,522,901[8] ("Dauphinee '901"). Dauphinee '901 relates to direct sampling tuners that can be implemented in cable modems, satellite set top boxes, and set top boxes. Dauphinee '901 at 1:26-30 and 2:12-16. As another example, U.S. Patent No. 7,394,871 to Zhang ("Zhang 871"), which is

[7] An earlier version of this IEEE article, titled "An embedded 65nm CMOS low-IF 48MHz-to-1GHz dual tuner for DOCSIS 3.0" was disclosed at the 2009 IEEE International Solid-State Circuits Conference, February 2009. *See*, *e.g.*, https://ieeexplore.ieee.org/document/4977338.

[8] The Dauphinee 901 patent was filed in 2004—five years before the April 2009 priority date of the '362, '206, and '866 patents.

also a Broadcom patent, discloses a television system including a high-speed analog-to-digital converter for performing wideband ADC conversion by converting an "entire signal band" included in a multi-channel analog RF signal from the analog domain to a digital domain. *See*, *e.g.*, Zhang 871 at 3:15-19, 3:60-63. The source of Zhang's multi-channel analog RF signal includes satellite systems, terrestrial TV systems, cable systems, etc. *Id*.

In addition to cable modems and set-top boxes, the concept of "direct conversion" of broadband RF spectrum had already been applied to numerous applications. For example, an EE times article published in 2007 describes the "AD 9042," manufactured by Analog Devices, applicable as a "wideband ADC designed for communications applications." *See* https://www.eetimes.com/basics-of-adcs-and-dacs-part-4/. *See also* https://www.analog.com/media/en/technical-documentation/data-sheets/ad9042.pdf (data sheet describing the AD 9042 as the first commercially-available ADC applicable to address the needs of wideband, multichannel receivers such as those used in cellular base stations and GPS receivers).

Another application where "direct conversion" of digital spectrum was used was in the design of Bluetooth and Ultra Wide Band (UWB) transceivers. *See*, *e.g.*, https://www.youtube.com/watch?v=Lv1y6fAMzPM (YouTube video showing MaxLinear co-founder and named inventor of the '362, '206, and '866 patents Curtis Ling pointing out the system-on-chip (SoC) product development timeline starting around 2002). Further, the 2008 textbook "Silicon-Based RF Front Ends for UWB Radios," Springer refers to "correlators" as "mixers" and describes the direct conversion concept used for Ultra Wideband Receivers. *See generally id*. at Fig. 2.7 and associated discussion.

Further still, TV tuners performing the step of "down-conversion" at the input stages was well-known in the prior art. For example, US Patent No. 7,274,410 ("Birleson 410") discloses, with reference to the components of a TV tuner, "[f]ollowing the input filter and amplifier, the RF signal is converted to an IF signal in

a dual mixer conversion circuit. The conversion circuit generally up-converts the RF to a first IF signal and then down-converts the first IF signal to a second IF signal having a 45.75 MHz picture carrier." Birleson 410 at 3:39-43. Similarly, the concept of down-conversion after analog-to-digital signal processing was also well-known, as reflected in Broadcom's publications, which depict a fully-fabricated semiconductor that performed down-conversion after analog-to-digital conversion. *See* "An embedded 65 nm CMOS baseband IQ 48 MHz-1 GHz dual tuner for DOCSIS 3.0" Francesco Gatta et al. ("Gatta"), published in the IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 44, NO. 12, DECEMBER 2009; "An embedded 65nm CMOS low-IF 48MHz-to-1GHz dual tuner for DOCSIS 3.0," Francesco Gatta et al (February 2009).

Thus, before the earliest priority date asserted by Entropic for the '362, '206, and '866 patents, the concepts claimed in the '362, '206, and '866 patents were well-known in the prior art.

G. The Asserted Patents

1. The '775 Patent

The '775 patent, filed September 30, 2003 relates to architectural aspects of cable modem systems. The '775 patent proposes using functional partitioning of the different components included in the cable modem. For example, the '775 patent describes partitioning "data networking functions (advanced bridging/routing, NAT/firewall, VPN, web server and CableHome applications) from DOCSIS cable modem functionality. This is accomplished by localizing data networking functions in the data networking engine processor and localizing cable modem functions in the cable modem engine processor." '775 patent at 4:13-19. The '775 patent describes that the data networking engine "is responsible for all data networking processing including advanced multi-port bridging/routing with NAT/firewall and VPN (block 250) and home networking applications (CableHome, Web Server, etc.) (block 252). In one implementation, the entire embedded portal services (PS) functionality of the CableHome specification is contained within data networking engine 120, with the

CableHome functionality being completely decoupled from the PacketCable and DOCSIS functionality provided by cable modem engine 110." *Id*. at 3:49-58. The '775 states that the purported benefit "of the virtual de-coupling from cable modem engine 110, data networking engine 120 can be independently software-upgraded without impacting the functionality of cable modem engine 110 (and vice versa)." *Id*. at 3:58-62.

However, this concept is not novel. For example, a technical article, published in 2002, titled "Flash Upgrading the CiM-550 Satellite Modems" discloses a satellite modem having modem firmware (M&C) and a CIM IP module firmware with independent download functionality. As other examples, US Pub. No. 20030167373 to Winters ("Winters 373") and US Pub. No. 20020012347 to Fitzpatrick ("Fitzpatrick 347") both disclose a method to download an updated operating system software to flash memory of a DOCSIS compliant cable modem.

As another example, this concept was also implemented in routers and modems such as Cisco's uBR924 router and Motorola's SURFboard SB3100 cable modem, and inherent to the existing DOCSIS cable modem chip architecture. *See*, *e.g.*, Exhibits R-7 and R-9 (showing teardowns of Cisco's uBR924 router and Motorola's SURFboard SB3100 cable modem). Upon information and belief, Cisco's uBR924 router implements the architecture reflected in the BCM3300 Datasheet. As reflected in the BCM3300 Datasheet, the use of a cable modem engine partitioned from the home networking engine, wherein "the cable modem engine [is] configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine" was standard cable modem architecture. Defendants' investigation is ongoing. Defendants reserve the right to assert any applicable inequitable conduct defense and otherwise amend or supplement these charts based on that investigation.

2. The '690 Patent

The '690 patent claims priority to two provisional applications (Prov. App 61/122,687, filed December 15, 2008 and Prov. App 61/179,454 filed May 19, 2009). The '690 patent relates to a method of generating a channel assessment probe based on parameters determined by a receiver of the probe. Specifically, the background of the '690 patent admits that "probes are sent between nodes of the network in order to allow a receiving node on the network to determine some of the characteristics of the channel between the receiving node and the transmitting node." '690 patent at 1:49-53. To that end, the '690 patent proposes that a "receiving node may generate a probe request that specifies a plurality of parameters to be used in such a "receiver determined" probe to generate a probe having the "form" specified by these parameters." *Id.* at 2:3-6. The '690 patent states that "receiver determined probes" may be used in a variety of applications. "For example, the probes may be used to reach or discover hidden nodes; in networks employing orthogonal frequency division multiple access (OFDMA), the probes may be used for OFDMA sub-channel assessment; or in networks accessible by content providers, the probes may be used for off-site network diagnosis." *Id.* at 2:20-27.

But DOCSIS 3.0 Specification discloses this concept. For example, DOCSIS 3.0 Specification discloses a "Ranging Request (RNG-REQ)" transmitted by the CM node that corresponds to the claimed "probe request" recited in claim 1.

6.4.5.1 Ranging Request (RNG-REQ)

The RNG-REQ message transmitted by the CM MUST use an FC_TYPE = MAC Specific Header and FC_PARM = Timing MAC Header, followed by a Packet PDU in the format shown in Figure 6-20.

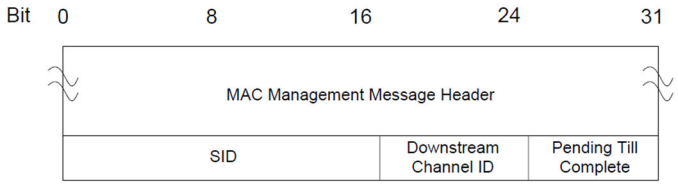


Figure 6-20 - Packet PDU Following the Timing Header

The parameters of RNG-REQ messages transmitted by the CM MUST be as follows:

SID: For RNG-REQ messages transmitted in Broadcast Initial Maintenance intervals:

- Initialization SID if modem is attempting to join the network
- Initialization SID if modem has not yet registered and is changing upstream, downstream, or both downstream and upstream channels as directed by a downloaded parameter file
- Ranging SID (previously assigned in REG-RSP) if modem is registered and is changing upstream channels, or if the CM is redoing initial ranging as a result of a DBC, DCC, UCC, or UCD change (see Sections 6.4.3 and 11.1)
- Primary SID (previously assigned in REG-RSP) for Pre-3.0 DOCSIS operation, if modem is registered and is changing upstream channels, or if the CM is redoing initial ranging as a result of a DCC, UCC, or UCD change (see Sections 6.4.3 and 11.1)

For RNG-REQ messages transmitted in Unicast Initial Maintenance or Station Maintenance intervals:

- Temporary SID if modem has not yet registered
- Ranging SID (previously assigned in REG-RSP) if modem is registered or is redoing initial ranging as a result of DBC, DCC, UCC, or UCD change
- Primary SID (previously assigned in REG-RSP) for Pre-3.0 DOCSIS operation, if modem is registered or is redoing initial ranging as a result of DCC, UCC, or UCD change

This is a 16-bit field of which the lower 14 bits define the SID.

Downstream Channel ID: The identifier of the downstream channel on which the CM received the UCD which described this upstream. This is an 8-bit field.

Pending Till Complete: If zero, then all previous Ranging Response attributes have been applied prior to transmitting this request. If non zero, this is time estimated to be needed to complete assimilation of ranging parameters. Note that only equalization can be deferred. Units are in unsigned centi-seconds (10 msec).

DOCSIS 3.0 Specification at 6.4.5.1.

As another example, US Pub. No. 20080304427 to Biswas ("Biswas 427") discloses generating "probe requests" as part of a node's self-configuration and operation in a wireless network. "[W]hen a node A issues a probe request received by node B, the node B includes the A-to-B SNR in its probe response, and when node A receives node B's probe response, node A will also know the B-to-A SNR); the IS_GW value, the IS_MERAKI value, and the gateway metric value." Biswas 427 at [0049].

In its infringement contentions, Entropic alleges that the accused products as "performing preventative network maintenance ("PNM")" functionality[9]. Infr. Contentions, Ex. B at 3. As discussed herein, DOCSIS 3.0 released in 2006 provides a proactive network maintenance (PNM) functionality. It is well known that Comcast had its own implementation of a PNM application named Scout Flux. "Comcast took the lead early on and created a PNM application called "Scout Flux." *See*, e.g., "An Introduction to PNM," Ron Hranac. "The Scout tool uses a combination of complex mathematics and end-of-line performance checkpoints (the more than 40 million modems and set-top boxes deployed in customers' homes) to identify locations of signal impairments potentially causing video or audio quality issues for customers." *See*, *e.g.*, https://corporate.comcast.com/comcast-voices/comcast-develops-network-scout-to-keep-customers-connected. Comcast has produced accompanying documentation that indicates Comcast was working on the Scout Flux tool at least as early as February 2010. *See*, *e.g.*, COMCAST_00004696-COMCAST_00004701 and COMCAST_00004702-COMCAST_00004717. Thus, before the earliest priority date of the '690 patent, it was well-known that PNM applications, including Comcast's own PNM application was available for public use.

As a separate issue, upon information and belief, Defendants understand that Entropic and/or its prosecution counsel failed in their duty to disclose to the U.S. Patent Office several prior art documents material to the patentability of the '690 Patent. Specifically, Entropic did not disclose the prior art references cited in the EP Search Report of EP App. No. 09 83 5530, which is the European counterpart of PCT/US2009/067586. The '690 Patent has the same Specification as PCT/US2009/067586, was filed on the same day, both claim priority to the same provisional applications (Provisional application No. 61/122,687, filed Dec. 15, 2008 and Provisional application No. 61/179,454, filed May 19, 2009) and is therefore related

[9] As evidenced by documents Comcast has produced, Comcast refers to this technology as "proactive network maintenance."

to the subject matter of PCT/US2009/067586. 37 CFR 1.56 requires that "each individual associated with the filing and prosecution of a patent application has a duty to disclose all information known to that individual to be material to patentability as defined in the section. Thus, the duty applies to contemporaneously or presently known information." Despite this, Entropic did not disclose to the Patent Office information relating to two prior art references:

- ""G.hn: MoCA Specification;08AB-121", ITU-T DRAFT; STUDY PERIOD 2005-2008, INTERNATIONAL TELECOMMUNICATION UNION, GENEVA; CH, vol. 4/15, 11 June 2008 (2008-06-11), pages 1-251, XP017534297, [retrieved on 2008-06-11]
- WO 2009/044382 to Malik ("Malik 382")

See Search Report of EP Search Report of EP App. No. 09 83 5530 at 1. The above prior art references disclose and/or render obvious the claim limitations of the '690 patent. *See*, *e.g.*, Exhibit Q-10 charting the '690 patent to Malik 382. Defendants' investigation is ongoing. Defendants reserve the right to assert any applicable inequitable conduct defense and otherwise amend or supplement these charts based on that investigation.

3. The '682 Patent

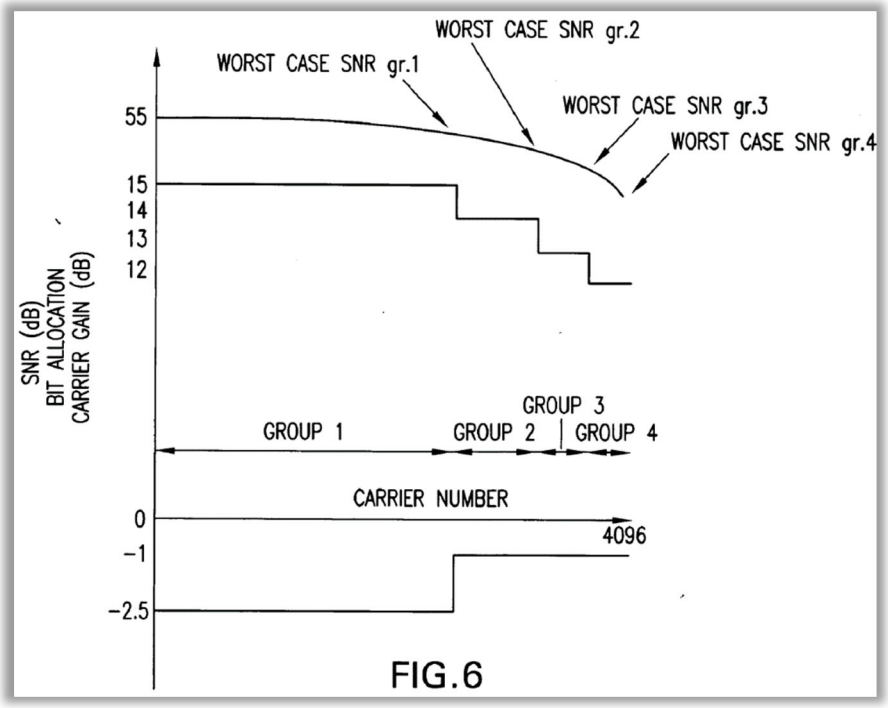
The '682 patent claims priority, through a series of intervening applications, to a provisional application (Prov. App. 61/674,742) filed in July 2012. The '682 patent relates to service group management in a cable television network. For configuring a cable television network that includes a cable modem termination system (CMTS) serving a plurality of cable modems (CMs), the CMTS may determine performance metrics of the CMs it serves. For example, a performance metric can be an SNR-related metric such as SNR over a range of frequencies, which the '682 patent terms as an "SNR profile." '682 patent at 3:55-58. With reference to the flowchart in Figure 3A, the '682 patent describes that "[t]he process begins with block 302 in which the CMTS 102 sends one or more probe messages 202 to the CMs 112 1-112 5. In block 304, each of the

CMs 112 1-112 5 determines its respective SNR profile based on a received one of the messages 202, and reports the SNR profile back to the CMTS 102 in the form of a message 204. In block 306, the CMTS 102 assigns the CMs to service groups based on the SNR profiles." 682 patent at 5:32-39. The '682 describes an example of how CMs are assigned to service groups based on their reported SNR profiles. "[A]ssume that CMs 112 $_1$, 112 $_4$, and 112 $_5$ of FIG. 1 have sufficient SNR on channel z to support 64-QAM on channel z, but that CMs 112 $_2$ and 112 $_3$ only have sufficient SNR on channel z to support 16-QAM. If 112 $_1$ is assigned to the same service group as 112 $_2$ or 112 $_3$, then 112 $_1$ may be forced to use 16-QAM on channel z. Conversely, if 112 $_1$, 112 $_4$, and 112 $_5$ are assigned to a first service group and 112 $_2$ and 112 $_3$ are assigned to a second service group, then the first service group consisting of 112 $_1$, 112 $_4$, and 112 $_5$ can use 64-QAM on channel z while the second service group consisting of 112 $_2$ and 112 $_3$ uses 16-QAM on channel z." '682 patent at 5:58-6:2. The '682 patent explains that "without such grouping by SNR profile, one CM in a particular service group may have substantially lower SNR on one or more channels/subcarriers. As a result, all CMs in that particular service group may be forced to use physical layer parameters supported by this "lowest common denominator" CM. This may result in a lot of wasted capacity for the remaining CMs." '682 patent at 5:50-57.

However, the concept of grouping CMs to be assigned to logical channels based on network parameters such as SNR was well-known. For example, US Pub. No. 20070223512 to Cooper ("Cooper 512") discloses "using thresholds to isolate the various logical channels and the associated channel profile configuration (parameters) for each logical channel" and further that "[t]he threshold values may be … determined based on mathematical techniques such as a mean value of a measured network parameter." Cooper 512 at [0030]. Similarly, during prosecution the examiner acknowledged that the Prodan reference disclosed the same. *See e.g.*, Appl. 15/866,106 File History, Apr. 3, 2018 O.A. at 24-26.

As another example, a Qualcomm prior art reference, U.S. Pat. No. 8,989,675 ("the '675 patent"), filed in January 2012, discloses a "logical component … for defining a carrier set [and] grouping carriers into carrier sets based on a commonality or similarity of one or more criteria," and further that the "logical grouping … can include … transmitting a CQI representative of the carrier set in its entirety." '675 patent at 20:40-49.

Not only was grouping carriers based on channel quality known, but additionally, grouping carriers based on worst-case SNR across carriers was also well-known. *See*, *e.g.*, U.S. Pub. No. 2005/0111535 ("Saey 535") published in May 2005—seven years before the earliest priority date of the '682 patent discloses "multiple carrier groups are determined which may be of either fixed or variable size. In a further embodiment, the carriergroup parameter defining each carrier group is the worst case signal-to-noise ratio for each carrier group" Saey 535 at [0013]. "The carriergrouping means 208 may then determine the worst case SNR for the plurality of carriers, define the plurality of carriers as one carrier grouping, and use this worst case SNR to define a carriergroup parameter for the one carrier grouping. This carriergroup parameter could then be stored in the receiving carriergroup parameter storing means 210 of the near end system and be used for all messages received using the one carrier grouping." Saey 535 at [0026]. *See also* Saey 535 at Figure 6 (reproduced below). Although Saey does not expressly state "composite SNR-related metric," Saey's "carrier group parameter" defined using the worst case SNR corresponds to the "composite SNR-related metric" recited in the '682 claims. Saey 535 applies to modems implementing discrete multi-tone (DMT) modulation techniques.



Saey 535 at Figure 6.

Before the earliest priority date of the '682 patent, it was common knowledge in the industry that a future DOCSIS standard would be implementing OFDM. For example, the paper "Mission is Possible: An Evolutionary Approach to Gigabit-Class DOCSIS," John T. Chapman et al., published in NCTA 2012 ("Chapman") recognizes that "current DOCSIS 3.0 MAC provides all the necessary capabilities to extend DOCSIS service to future gigabit rates, the challenge becomes optimizing the PHY layer" and then states that "*it is suggested that the OFDM/OFDMA/LDPC wide channel is the best candidate for next generation gigabits capable DOCSIS PHY layer*." Chapman at 96, 110 (emphasis added). *See also id.* at 177. As the paper informs, DOCSIS 3.1 released in 2013, implements OFDM. As another example, the paper "Next Generation - Cable Access Network, An Examination of the Drivers, Network Options, and Migration Strategies for the All-IP Next Generation – Cable Access Network", M. Emmendorfer et al., 2011 Spring Technical Forum, Chicago, IL June 14-

16, ("Emmendorfer") describes that "*a DOCSIS OFDM (orthogonal frequency division multiplexing) based system that could emerge in the future*" and "industry plans to adopt OFDM in the DOCSIS standard." Emmendorfer at 10. Thus, prior to the earliest priority date of the '682 patent, it was commonly known in the industry that DOCSIS 3.1 would be implementing OFDM.

As a separate issue, upon information and belief, Defendants understand that Sridhar Ramesh, named inventor on the '682 patent was involved as a contributor to CableLabs as early as 2012. CableLabs is the organization that developed the DOCSIS standards. For example, DOCSIS 3.1 Physical Layer Specification (Revision History I01-released October 29, 2013) describes on p. 209 that inventor Sridhar Ramesh of MaxLinear as a contributor to that document. Despite knowledge of DOCSIS as material prior art, the inventor(s) and their prosecuting attorneys failed to disclose during prosecution of the '682 patent to the United States Patent and Trademark Office in violation of their duty of disclosure under 37 C.F.R. § 1.56. At least, the DOCSIS 3.0 standard, released in 2006—six years before the earliest claimed priority of the '682 patent discloses and/or renders obvious the claim limitations of the '682 patent. *See*, *e.g.*, Ex. P-8 charting the claims of the '682 patent to the DOCSIS 3.0 Specification. Defendants' investigation is ongoing. Defendants reserve the right to assert any applicable inequitable conduct defense and otherwise amend or supplement these charts based on that investigation.

4. The '008 and '826 Patents

The '008 and '826 patents belong to the same family and share substantially the same specification and drawings. Both patents claim earliest priority to Prov. App 61/532,098, filed September 8, 2011. At a high level, the '008 and '826 Patents are directed to cable and satellite television systems that monitor a received signal to assess whether signal quality falls within acceptable parameters. The '008 patent states that "[c]onventional methods and apparatuses for monitoring network parameters" were "too costly and impractical for use in customer-premises equipment (CPE)." '008

patent, 1:42-45. Purportedly to solve this problem, the '008 patent proposes using known mechanisms, including analog-to-digital conversion of the received signal, measuring signal characteristics of the received signal, and reporting back the measured characteristics to a source of the receive signal to enable a low-cost monitoring solution.

Figure 1A of the '008 patent illustrates a conventional cable television communication system, including conventional components, such as a headend 108 and a hybrid fiber-coaxial ("HFC") network 118, for distributing television signals to customers' premises. The system illustrated in Figure 1A does not depict core features of the claims of the '008 patent, but instead illustrates a known cable television system.

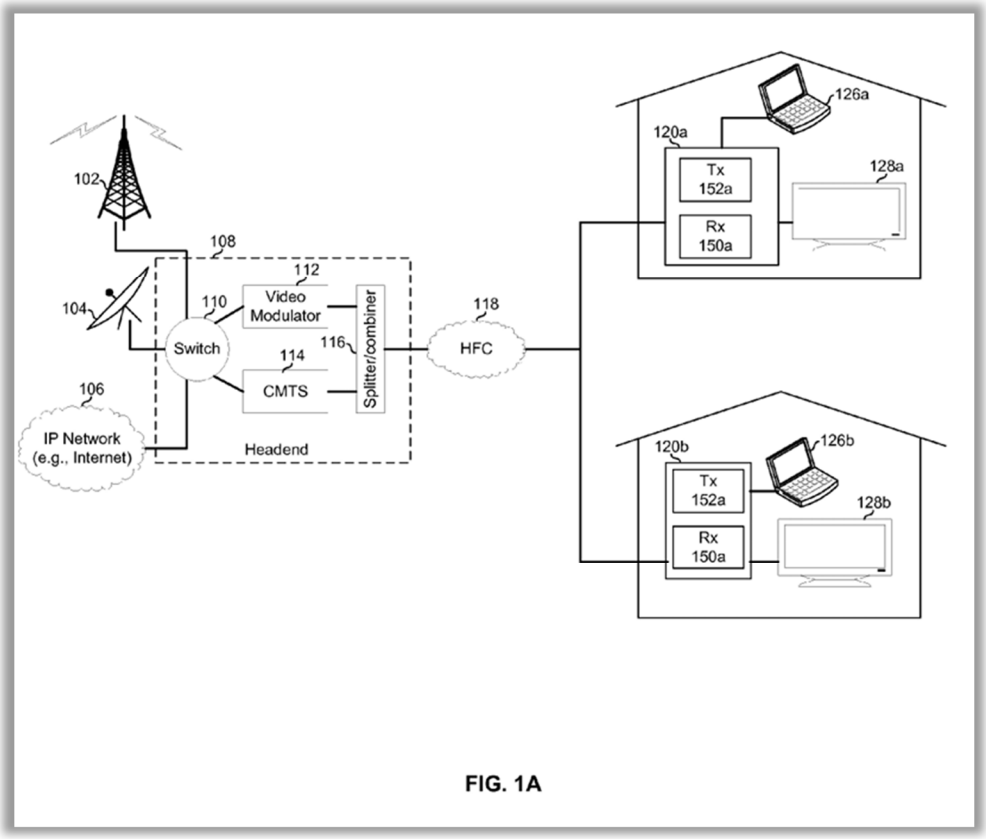


FIG. 1A

'008 Patent at Figure 1A (showing Prior Art Cable Television System)

Figure 1B shows the spectrum analysis components of the '008 patent, including RF receive front-end 158, channelizer 152, monitoring unit 154, and data processing unit 156, all of which are located at a customer's premise. *See* '008 patent at 3:5-4:10.

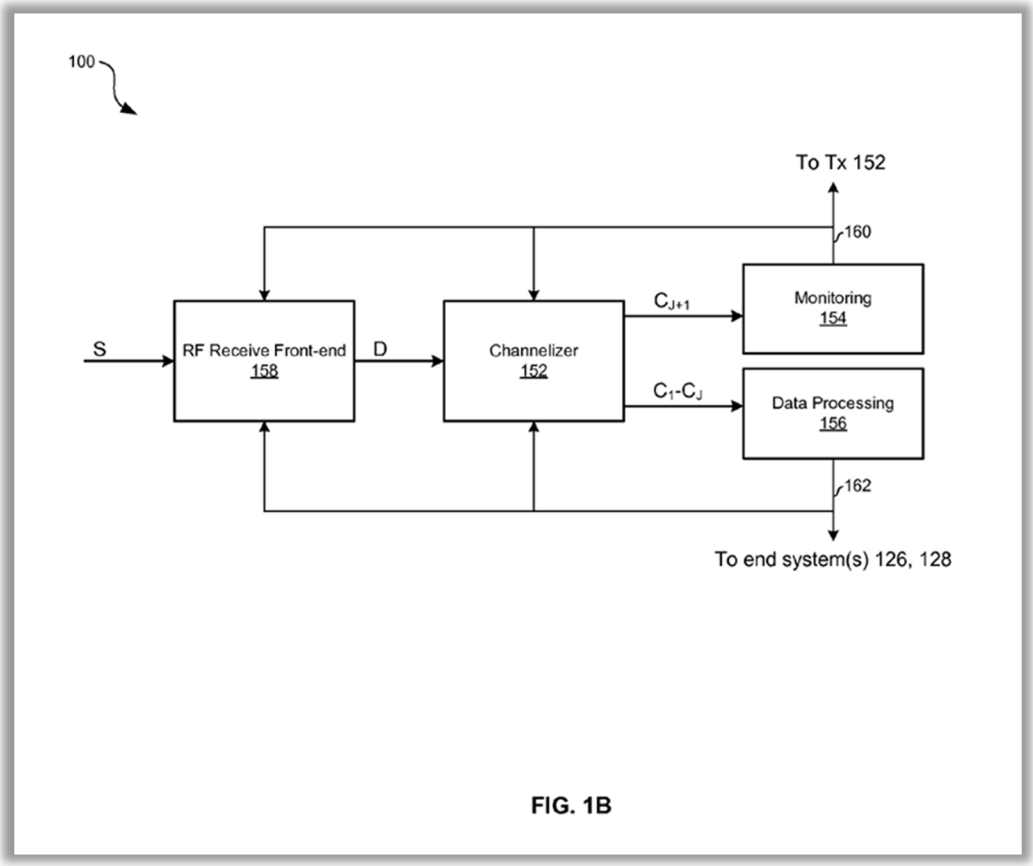


FIG. 1B

'008 Patent at Figure 1B (showing spectrum monitoring components)

The '008 patent states that the receiver 100 including a RF receive front-end 158 that further includes an analog-to-digital converter ("ADC") to digitize the received signal before transmitting the signal to channelizer 152. Upon receiving the analog signals, the ADC converts the signals to a multi-channel digital signal. Channelizer 152, located inside the receiver 100 receives the digitized signal and divides it into a plurality of channels. Channelizer 152 then selects portions of the channelized signal—specifically CJ+1 and C1-CJ—and transmits a first selected portion (CJ+1) to monitoring module 154 where it is analyzed to determine signal characteristics, such as signal-to-noise ratio ("SNR"). Concurrently, channelizer 152 transmits a second selected portion (C1-CJ) to data processing module 156, where the second selected portion is processed to recover encoded data. *Id*. at 3:11-60, 4:26-50, 6:21-31.

But the concept of spectrum monitoring was well-known in the art. For example, US Pub. No. 20070286311 to Coyne ("Coyne 311") discloses a multi-channel channelized receiver in a communications system that detects signals across multiple RF channels, combines the signals, creates a digital representation of the signal, and feeds the digital signal into a channelizer. *See generally* Coyne 311 at Abstract, [0006], [0020]-[0022], [0029]-[0031]. As another example, US Pat. No. 8,649,421 to Renken ("Renken 421") discloses a downstream measurement system (DMS) 128 (provided at the location of the CMTS) "perform[ing] downstream spectral measurements, that is to measure the cable network transmission characteristics in dependence on channel frequencies, i.e. on channel per channel basis. … [T]he DMS 128 performs level measurements on DOCSIS downstream channels generated by the CMTS and/or the analog and digital TV channels generated by the CATV transmitters 129, and reports these measurements to the [central measurement controller] CMC." Renken 421 at 20:27-36.

Claim 1 of the '826 patent, which is a continuation of the earlier-filed '008 patent, additionally recites the "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages." In its infringement contentions, Entropic cursorily states "[f]or example, the Technicolor CGM4140 provides information to a PNM system operated by Comcast. This allows the received signals to be analyzed at a customer's premises (e.g., where the Technicolor CGM4140 is located) and the received signals can be remotely analyzed without driving to the customer's premises or accessing the in-home wiring." Infr. Contentions, Ex. E at 9-10.

As a separate issue, Tim Gallagher, listed as an inventor on the '008 and '826 patents was also involved in the prosecution of U.S. Patent No. 8,526,898 ("the '898

patent[10]"), which contains substantial overlapping subject matter relating to digitizing a television signal. The '898 patent, issued to Entropic, was filed in April 2010, before the earliest alleged priority of the '008 and '826 patents. *See*, *e.g.*, Exhibits M-9 and S-7 charting the '008 and '826 patent claims to the PG publication of the '898 patent (i.e., US Pub. No. 2011/0105068). Despite knowledge of the '898 patent that is material to the validity of the '008 and '826 patents, the inventors and their prosecuting attorneys failed to disclose the '898 patent during prosecution of the '008 and '826 patents to the United States Patent and Trademark Office in violation of their duty of disclosure under 37 C.F.R. § 1.56.

5. The '206, '866, and '362 Patents

The '206, '866, and '362 Patents, all belong to the same family sharing the same Specification and drawings, and claim earliest priority to Prov. App. 61/170,526, filed April 17, 2009. The shared specification purportedly "relates to wideband receiver systems and methods having a wideband receiver that is capable of receiving multiple radio frequency channels located in a broad radio frequency spectrum." '362 patent, 1:15-18. Figure 2 of the '362 patent illustrates the schematic block diagram of a first embodiment of a wide band multi-tuner receiver 200 that includes a radio front end portion 210 coupled to a digital front end portion 230. "Wideband receiver system 200 includes a radio front end 210 and a digital front end 230. Radio front end 210 may be a single very wide-band tuner receiver that captures the desired swath of channels located in non-contiguous portions of the spectrum having a frequency bandwidth BW1 120." Amplified RF signal 203 passes through conventional mixers M1 211 and M2 221 and "an in-phase signal 212 and a quadrature signal 222 that have a phase shift of 90° degree between them" are generated. The shared specification explains that "to generate a filtered in-phase signal 216 and a filtered quadrature signal 226," the "[i]n-phase signal 212 and quadrature signal 222 are further amplified and filtered by

[10] The '898 patent belongs to the same family and shares substantively the same Specification and drawings as the '206, '362, '866 patents.

respective amplifiers V1 213, V2 223 and filters F1 215, F2 225 [which] … filter out any unwanted frequency components of the signals 214 and 224 before digitizing them for further processing in digital front end 230." The shared specification continues by stating that "ADC1 218 generates a digital signal I 232 that is a digital representation of the analog filtered signal 216; ADC2 228 generates a digital signal Q 242 that is a digital representation of the analog filtered signal 226." *See generally* '362 patent, 4:16-5:31. *See also* Fig. 2 reproduced below.

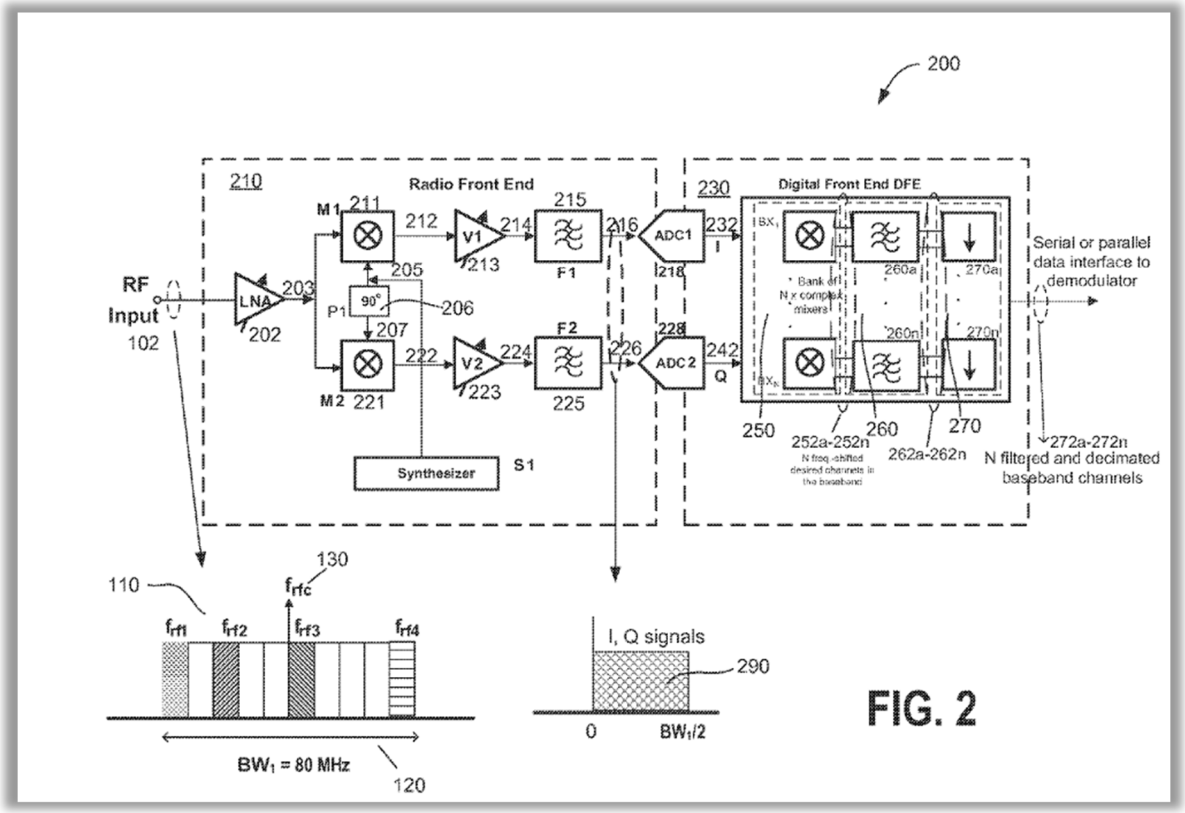


FIG. 2

'362 patent, Fig. 2.

Figure 4 of the '362 patent illustrates the schematic block diagram of a second embodiment of a wide band multi-tuner receiver 400 that includes a radio front end portion 410 coupled to a digital front end portion 430 coupled to a tiled upconversion portion 450 coupled to a digital-to-analog converter (DAC) portion 470. "Radio front end 410 includes a low noise amplifier LNA1 that receives an RF input signal 102 and provides an amplified RF signal 403 to mixers M1 411 and M2 421 … [which] generate

respective in-phase signal 412 and quadrature signal 422 that are further amplified by respective amplifiers V1 413 and V2 423." The shared specification explains that "to eliminate undesired frequency components that would be aliased back to the in-phase and quadrature signals when digitally sampled by subsequent analog-to-digital converters ADC1 418 and ADC2 428," "[t]he amplified in-phase and quadrature signals 414, 424 are then filtered by filters F1 415 and F2 425." See generally '362 patent, 6:65-7:21. The shared specification, again, expressly describes eliminating or removing undesired frequency components present in the input signal before digitization by ADC1 418 and ADC2 428. As a consequence of the filtering to remove unwanted frequencies, the shared specification admits that "[d]igital signals I 422 and Q 442 at the input of digital front end 430 are digital representations of the filtered analog in-phase and quadrature signals 416, 426 before the ADCs." The shared specification even touts the benefit of the filtering: "remov[ing] undesired channels from the signal path at an early stage … relieves the requirement of a high dynamic range requirement of the demodulator's analog-to-digital converter and the demodulator itself." '362 patent, 8:6-9.

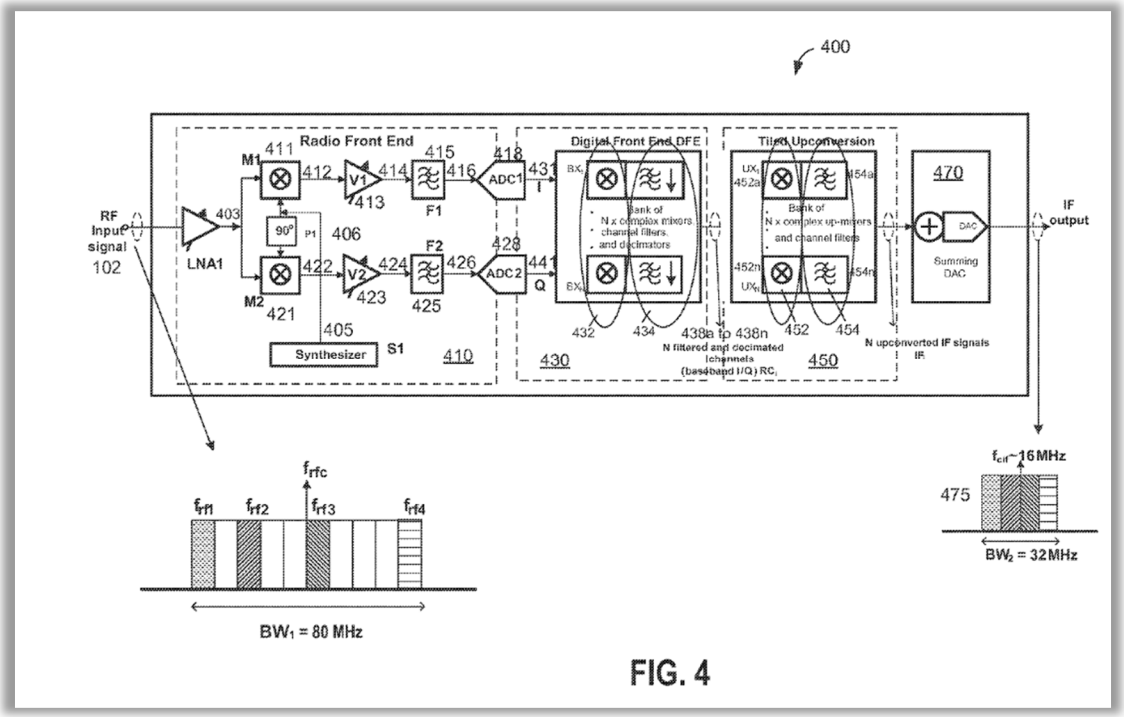


FIG. 4

'362 patent, Fig. 4.

But the concept of "wideband digitization," which is the claimed subject matter of the '362, '206, and '866 patents was well-known. For example, U.S. Patent No. 7,394,871 to Zhang ("Zhang 871") discloses "wideband digitization," including allowing simultaneous reception of multiple content streams while enabling wideband return communications in satellite and cable systems. *See generall*y Zhang 871 at 6:38-61. As another example, U.S. Pat. No. 8,902,369 to Pugel ("Pugel 369") related to multi-channel television reception. Pugel discloses techniques of conversion, filtering, and channel selection. *See* Pugel at Abstract and Figure 1.

Stacking multiple digital tuners to implement a single wideband digital receiver was well-known. For example, U.S. Pat. No. 5,590,156, titled "Multichannel wideband digital receiver making use of multiple wideband tuners having individually selectable gains to extend overall system dynamic range" ("Carney 156"), which issued Dec. 31, 1996, teaches using multiple digital tuner sections and multiple channelizers to implement a wideband digital receiver. *See, e.g.*, Carney 156 patent, Fig. 1. "[T]he channelizers 16 [shown in Fig. 1] may make use of a digital integrated circuit which accepts a wideband digital input and provides a downconverted output, such as HSP 50016 Digital Downconverter sold by Harris Semiconductor, Inc., of Palm Bay, Fla." Carney 156, 11:16-21. "In another embodiment, the multiple digital tuner sections need not each service the same bandwidth, but rather may each be dedicated to covering a different proportion of the bandwidth serviced by the basestation. In particular, the relative sizes of the bandwidths covered by individual tuners are selected depending upon the expected distribution of the density of relatively strong signals and relatively weak signals. In the typical situation, where the subscriber units are more or less evenly distributed geographically, there usually are many more weaker signals than stronger signals to be serviced. This is because the received signal strength varies as an inverse exponential of the distance between the basestation and the subscriber unit." Carney 156, 4:7-19. As another example, U.S. Pat. No. 7,274,679 to Amit ("Amit 679")

discloses a "SVC cable modem 158 includ[ing] a plurality of PHY receivers Rx1/Rx2 (shown generally as 162) coupled to the MAC 159." Amit 679 at 6:50-53. As yet another example, U.S. Pat. No. 7,017,176 to Lee ("Lee 176") discloses a cable modem 300 including two processing blocks 307 a and 307 b which are "integrated cable MAC/PHY device or separate cable MAC or cable PHY devices or logic. [E]ach processing block may take the form of an integrated cable MAC/PHY device or separate cable MAC or cable PHY devices or logic." Lee 176 at 8:53-57. *See also* Figure 3 of Lee 176 (showing processing blocks 307 a and 307 b stacked vertically).

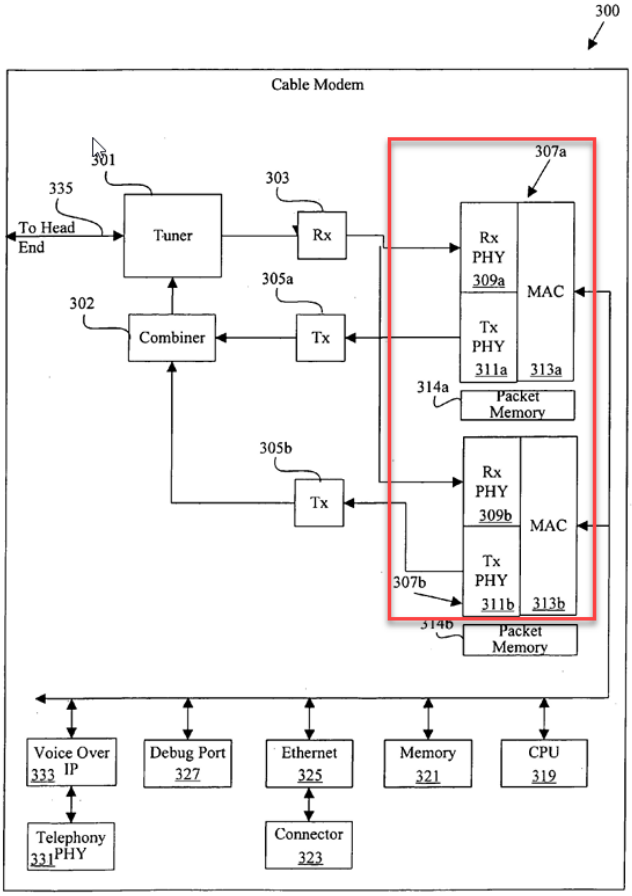


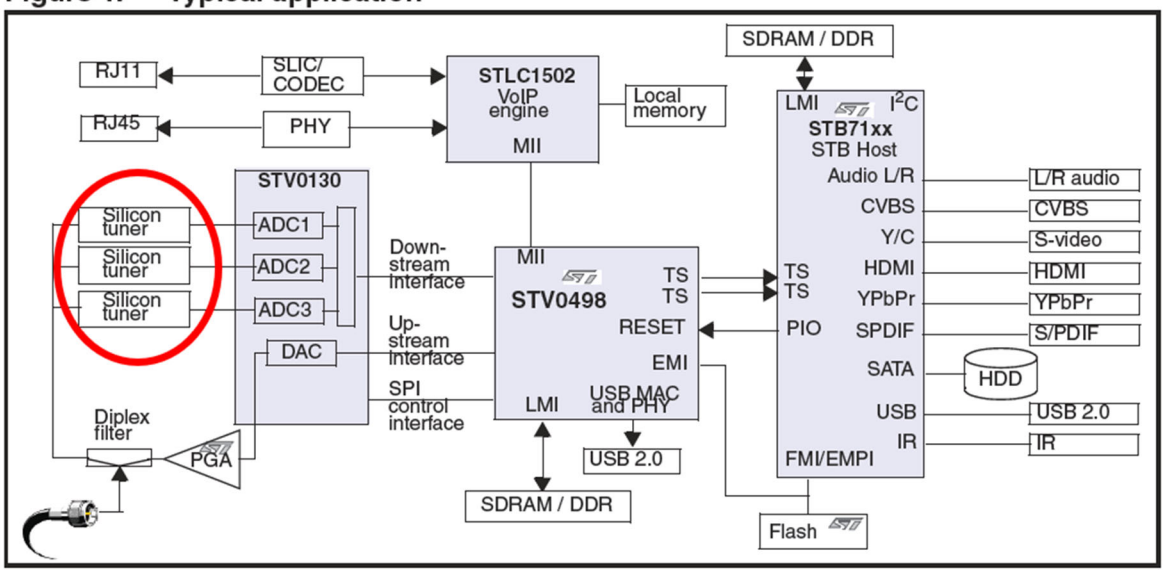
Figure 3

Lee 176 at Figure 3.

Not only was stacking well known in the literature, but commercially available chipsets implemented stacking as well. For example, the data brief of STV 0498, a

DOCSIS-compliant cable modem chipset implemented the stacking feature. Specially, Figure 1 (reproduced below) of the data brief shows three silicon stacked vertically.

Figure 1. Typical application



Data brief of STV0498 at Figure 1.

Thus, by reviewing one or more of Carney 156, Amit 679, Lee 176, and the data brief of STV 0498, it would have been obvious to a POSITA that stacking multiple tuner sections can be used in the design of a single wideband receiver.

Further, prior to the earliest claimed priority of the '362, '206, and '866 patents, chipsets, such as Broadcom's BCM 3380 were commercially available. *See*, *e.g.*, data sheet of the BCM 3380 (published in June 2008) describing it as the industry's first fully integrated solution for DOCSIS 3.0 applications and including a "wideband receiver," available at http://datasheet.elcodis.com/pdf/48/45/484522/bcm3380dkfsbg.pdf. Thus, before the earliest claimed priority of the '362, '206, and '866 patents, the claimed subject matter

was well-known in the conventional art and even commercial uses of the claimed functionality were also known.

As a separate issue, Entropic filed App. No. 12/762,950, which published as US 2011/0096874 containing substantial overlapping subject matter as the asserted '206, '866, and '362 Patents. The '950 application claims priority to US Prov. App. Nos. 61/170,526 (filed April 17, 2009) which is the *same* provisional to which the asserted '206, '866, and '362 Patents also claim priority. Defendants understand that there is substantial overlap in the subject matter between the '874 publication and the descriptions and drawings of the '206, '866, and '362 Patents. *Compare*, *e.g.*, Figures 2 of the '362 patent and 2B of the '874 publication; Figures 3 of the '362 patent and '874 publication); and Figures 6 of the '362 patent and 4 of the '874 publication. Further, the '874 publication admits that it "is related to" U.S. App. No. 12/762,900, which is the first non-provisional application filed in the '206/'866/'362 family. Even though there is substantial overlap in subject matter between the'874 publication and the '206/'866/'362 family, there is only one named inventor, Madhukar Reddy, listed in common between the '874 publication and the '206, '866, and '362 Patents. Defendants' investigation is ongoing and Defendants reserve the right to assert any applicable incorrect inventorship issue defense and otherwise amend or supplement these contentions based on the relevant prior art found from that investigation.

As yet another issue, Defendants understand that MaxLinear co-founder and named inventor Curtis Ling was aware of printed publications that disclose Bluetooth and Ultra Wide Band applications implementing "direct conversion" published before the earliest priority date of the '362, '206, and '866 patents. *See*, *e.g.*, https://www.youtube.com/watch?v=Lv1y6fAMzPM (YouTube video showing Curtis Ling pointing to various publications in connection with MaxLinear's system-on-chip (SoC) product development timeline starting around 2002.) Defendants intend to seek discovery to determine whether disclosure of any technology or materials in relation to efforts by inventor(s) of the Asserted Patents in the SoC product development invalidate

any of the asserted claims, including through public disclosure or public use. Defendants reserve the right to assert any applicable inequitable conduct defense and otherwise amend or supplement these charts based on that investigation.

Further still, the use of a wideband tuner which engages in downconverting, analog-to-digital conversion to digitize multiple channels, downconverting digitized channels and selecting channels was well-publicized through Broadcom's first DOCSIS 3.0 chip, as well as Broadcom's presentation relating to "An Embedded 65nm CMOS Low-IF 48MHz-to-1GHz Dual Tuner for DOCSIS 3.0" ("Gatta")) disclosed at the IEEE International Solid-State Circuits Conference, February 8 – February 12, 2009. The Gatta paper was authored by Broadcom engineers. *Id*. Upon information and belief, MaxLinear and the named inventors were well aware of these technological developments through their work on cable devices and as a major vendor of DOCSIS 3.0 components. Broadcom's work was material to the patentability of the claims of the '362, '866, and '206 patents, and the failure of the inventors and their prosecuting attorneys to report Gatta to the United States Patent and Trademark Office is in violation of their duty of disclosure under 37 C.F.R. § 1.56. Gatta discloses and/or renders obvious the claim limitations of the '362, '866, and '206 patents. *See*, *e.g.*, Exs. O-3, T-3, and N-3 charting the claims of the '362, '866, and '206 patents to Gatta. Defendants' investigation is ongoing. Defendants reserve the right to assert any applicable inequitable conduct defense and otherwise amend or supplement these charts based on that investigation.

H. Priority Date and Inventorship Issues

The priority dates that Entropic asserts in its Infringement Contentions for the '008, '826, '682, '690, '866, and '206 patents are not supported by the earlier applications, or otherwise the evidence upon which Entropic relies, including for the reasons set forth below. Defendants' evaluation is ongoing and Defendants reserve the right to supplement their challenges to the priority dates of the Asserted Patents as they continue to evaluate the support in the earlier patent applications in the priority chain

of the Asserted Patents. In its Infringement Contentions, Entropic identifies an earlier invention date for the '008 and '826 patents, to which Defendants respond below. To the extent that Entropic later alleges an earlier invention date for any of the other Asserted Patents, or a different earlier invention date for the '008 and '826 patents, Defendants reserve all rights to respond to those contentions and to modify, amend, and/or supplement these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art.

1. The '008 Patent

The '008 Patent claims earliest priority to Prov. App 61/532,098 (filed September 8, 2011) and further, in its Infringement Contentions, Entropic asserted that the '008 patent is "entitled to a priority date of at least as early as February 15, 2011," but provided no documents to support this assertion. *See* Infringement Contentions, dated September 15, 2023, at 8-9, *see also* Infringement Contentions Chart (Ex. C) at 2. Following a November 1, 2023, Meet and Confer, Counsel for Entropic represented that "with respect to the 008 Patent, there is a typographical error on the first page indicating an incorrect priority date. Attached is an updated chart for the 008 patent, reflecting the correct priority date of February 25, 2011. … You will receive a production later today containing support for this priority date." *See* November 1, 2023, Email to K. Padmanabhan. Subsequently that day, Entropic produced documents allegedly in support of its assertion of an earlier date of conception of the '008 Patent. *See* ENTROPIC_COMCAST_002972 - ENTROPIC_COMCAST_002974. However, the documents are deficient in that they fail to provide support for the claim limitations of the '008 Patent. For example, at least the claim limitation, a channelizer operable to "*select a first portion* of said digitized signal" and "*select a second portion* of said digitized signal" is not supported in the documents produced by Entropic.

It is Plaintiff's burden to show entitlement to its asserted priority dates, and Defendants assert that Plaintiff has failed to meet that burden. *See PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008). The documents Entropic

produced fail to provide support of an earlier date of conception of the '008 Patent. Further, even the '098 priority provisional fails to provide support for the claim limitations. For example, the '098 provisional fails to provide any support for a "[a signal monitor operable to] report said determined characteristic to a source of said received signal [spanning an entire television spectrum comprising a plurality of television channels]," as required in claim 1 of the '008 Patent. The lack of support for this limitation is especially important because that limitation was relied upon by the examiner as constituting allowable subject matter. *See* Office Action dated January 16, 2014 at 7. The written description of the '098 Provisional, however, does not set forth any disclosure sufficient to demonstrate that the inventor had possession of at least the above clamed subject matter at the time of filing the '098 Provisional or earlier, nor does the '098 Provisional describe at least the above claimed subject matter in such full, clear, concise, and exact terms to enable an ordinarily skilled artisan to practice the alleged inventions of the '008 Patent. To the extent Entropic relies on the document attached to the Appendix of the '098 Provisional for support of the above limitation, this document apparently "introduces a monitor 203 which takes as its input one of the channels cj 208 which can be scanned across an arbitrary portion of the spectrum occupied by si and measures any number of characteristics of that portion of the spectrum. This portion may comprise the entire spectrum or some fraction of it. Monitor 203 may use cj to assess signal power levels across si, the modulation, code rate and other information present in cj, the channel conditions and interference in cj, or any other information about the signal and channel that may be pertinent to the communication system." '098 Provisional FH at 30. Nowhere, however, is there any disclosure of the signal monitor "report[ing] said determined characteristic to a source of said received signal," as claimed. Thus, at best, the '008 Patent is only entitled to claim priority back to its own filing date, i.e., September 10, 2012. Accordingly, Defendants contend that the '008 patent is not entitled to an earlier priority date. To the extent Plaintiff asserts an earlier date of invention for the '008 patent, Defendants

reserve all rights to respond to that contention and to modify, amend, and/or supplement these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art. For example, Defendants have identified U.S. Patent No. 9,686,594 ("Gomez 594") as an anticipatory and/or an obviousness prior art reference invalidating the '008 patent. *See*, *e.g.*, Exhibit M-4 (charting the '008 patent to Gomez 594).

Still further, Entropic's production, identified by Bates number ENTROPIC_COMCAST_002972 - ENTROPIC_COMCAST_002974, which Entropic alleges as providing support of an earlier date of conception of the '008 patent, names C. Ling in the footer of the document. However, C. Ling is not a named inventor on the '008 patent. Defendants intend to seek discovery to determine whether C. Ling was involved in efforts relating to the invention of the claimed technology underlying the '008 patent. Defendants' investigation is ongoing. Defendants reserve the right to assert any applicable incorrect inventorship defense based on that investigation.

2. The '826 Patent

The '826 Patent, which belongs in the same family as the '008 Patent, claims earliest priority to Prov. App 61/532,098 (filed September 8, 2011), and further, in its Infringement Contentions, Entropic asserted that the '826 patent is "entitled to a priority date of at least as early as February 15, 2011," but provided no documents to support this assertion. *See* Infringement Contentions, dated September 15, 2023 at 8-9, *see also* Infringement Contentions Chart (Ex. E) at 2. Following a November 1, 2023 Meet and Confer, Counsel for Entropic represented that "… [w]e note that the 826 chart reflects the correct date. … You will receive a production later today containing support for this priority date." *See* November 1, 2023, Email to K. Padmanabhan. Subsequently that day, Entropic produced documents allegedly in support of its assertion of an earlier date of conception of the '008 Patent. *See* ENTROPIC_COMCAST_002972 - ENTROPIC_COMCAST_002974. However, the documents are deficient in that they fail to provide support for the claim limitations of the '826 Patent. For example, at least

the claim limitation, "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages" is not supported in the documents produced by Entropic.

It is Plaintiff's burden to show entitlement to its asserted priority dates, and Defendants assert that Plaintiff has failed to meet that burden. *See PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008). On the contrary, the documents Entropic produced fail to provide support of an earlier date of conception of the '826 Patent. Further, even the '098 priority provisional fails to provide support for the claim limitations. For example, the '098 provisional fails to provide any support for "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages, " as required in claim 1. There is simply no mention of "network management messages" much less "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages." The written description of the '098 Provisional does not set forth any disclosure sufficient to demonstrate that the inventor had possession of at least the above clamed subject matter at the time of filing the '098 Provisional or earlier, nor does the '098 Provisional describe at least the above claimed subject matter in such full, clear, concise, and exact terms to enable an ordinarily skilled artisan to practice the alleged inventions of the '008 Patent. Thus, at best, the '826 Patent is only entitled to claim priority back to its own filing date, i.e., November 23, 2015. Accordingly, Defendants contend that the '826 patent is not entitled to an earlier priority date. To the extent Plaintiff asserts an earlier date of invention for the '826 patent, Defendants reserve all rights to respond to that contention and to modify, amend, and/or supplement these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art.

For example, Defendants have identified U.S. Patent No. 9,686,594 ("Gomez 594") as an anticipatory and/or an obviousness prior art reference invalidating the '008 patent. *See*, *e.g.*, Exhibit S-5 (charting the '826 patent to Gomez 594).

Still further, Entropic's production, identified by Bates number ENTROPIC_COMCAST_002972 - ENTROPIC_COMCAST_002974, which Entropic alleges as providing support of an earlier date of conception of the '826 patent, names C. Ling in the footer of the document. However, C. Ling is not a named inventor on the '008 patent. Defendants intend to seek discovery to determine whether C. Ling was involved in efforts relating to the invention of the claimed technology underlying the '826 patent. Defendants' investigation is ongoing. Defendants reserve the right to assert any applicable incorrect inventorship defense based on that investigation.

3. The '682 Patent

The '682 Patent claims earliest priority to Prov. App. 61/674,742, filed July 23, 2012. However, the '742 provisional fails to provide any support for "generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups." At best, the '742 provisional states "to determine a CM's SNR, the CMTS may transmit (on one or more of the subcarriers, when OFDM is used) a message that is destined … for the CM and functions as a probe for determining SNR. The CM may process the transmission and measure the SNR for the transmission. The CM may then report the SNR back to the CMTS" and that "[t]he characteristics of CMs may be taken into account in assigning CMs to service groups. For example, CMs having similar SNR profiles may be grouped together." '742 provisional at [0012]-[0013]. But, grouping CMs having similar SNR profiles does not disclose *generating a composite SNR-related metric* much less "generating, … for each one of [a] plurality of service groups, a composite SNR-related metric based … on a worst-case SNR profile of … SNR-related metrics corresponding to … one of said plurality of service groups."

Accordingly, Defendants contend that the '682 patent is not entitled to an earlier priority date based on the '742 provisional application. To the extent Plaintiff asserts an earlier date of invention for the '682 patent, Defendants reserve all rights to respond to that contention and to modify, amend, and/or supplement these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art. For example, Defendants have identified U.S. Patent No. 9,647,786 ("Hanks 786") as an anticipatory and/or an obviousness prior art reference invalidating the '682 patent if it is not entitled to an earlier priority date based on the '742 provisional application. *See*, *e.g.*, Exhibit P-10 (charting the '682 patent to Hanks 786).

4. The '690 Patent

The '690 Patent claims earliest priority to two provisional applications: Prov. App 61/122,687, filed December 15, 2008, and Prov. App 61/179,454 filed May 19, 2009. However, neither the '687 provisional, nor the '454 provisional provides any support for generating a probe at a first node that "has a form dictated by" "content payload of the probe and a second node" which receives the probe, as required in claim 1. At best, the '454 provisional states that "a Receiver-Determined Probe payload contains a configurable reference signal that a receiver can request be sent from a particular transmitting node" and several PHY parameters (such as bitloading/constellation table, number of symbols in the payload, raw data sequence for the payload, preamble type, cyclic prefix length, Transmit power setting, and payload symbol scale factor) can be specified in the probe request. '454 provisional at [0007]-[0008]. But, this generic disclosure of *what* constitutes a probe does not disclose anything about "a form" of the probe, as required in claim 1.

Accordingly, Defendants contend that the '690 patent is not entitled to an earlier priority date based on the '687 provisional or '454 provisional applications. To the extent Plaintiff asserts an earlier date of invention for the '690 patent, Defendants reserve all rights to respond to that contention and to modify, amend, and/or supplement

these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art.

5. The '866 Patent

The '866 Patent claims earliest priority to Prov. App. 61/170,526, filed April 17, 2009. However, the '526 provisional fails to provide any support for "a plurality of digital down converters coupled to [a] wideband ADC," as required in independent claims 27 and 41. Put simply, there is simply no written description support in the '526 provisional for an ADC without prior down conversion. At best, the '526 provisional states "[t]he complex I/Q digital signal from the ADC pair feeds a bank of N complex mixers and filters BXi which frequency-shift the N desired TV channels to baseband where they are each individually filtered, producing N filtered and decimated radio channels RC." '526 provisional at 4. There is no support for "digital down converters" much less "a plurality of digital down converters coupled to [a] wideband ADC." To the extent there can be any disclosure to support these limitations, the first disclosure is the limitations of the claims themselves, and the earliest priority date afforded to the '866 patent must be Jan. 28, 2022.

Accordingly, Defendants contend that the '866 patent is not entitled to an earlier priority date based on the '526 provisional application. To the extent Plaintiff asserts an earlier date of invention for the '866 patent, Defendants reserve all rights to respond to that contention and to modify, amend, and/or supplement these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art. For example, Defendants have identified Motorola SURFBoard SB 6120 system art that was available for public use invalidating the '866 patent if it is not entitled to an earlier priority date based on the '526 provisional application. *See*, *e.g.*, Exhibit T-29 (charting the '866 patent to SB 6120 System Art).

6. The '206 Patent

The '206 Patent claims earliest priority to Prov. App. 61/170,526, filed April 17, 2009. However, the '526 provisional fails to provide any support for "digitizing ***all***

received channels in the input signal via a wideband analog-to-digital converter (ADC)," as required in independent claims 13 and 38. Additionally, the '526 provisional fails to provide any support for the step of "digitizing … [channels/frequencies] in the input signal via a wideband analog-to-digital converter (ADC)" prior to the step of "digitally down converting each desired channel [included in the input signal]," as required in independent claims 13, 25, and 38. At best, the '526 provisional states "[t]he complex I/Q digital signal from the ADC pair feeds a bank of N complex mixers and filters BXi which frequency-shift the N desired TV channels to baseband where they are each individually filtered, producing N filtered and decimated radio channels RC." '526 provisional at 4. There is no support for digitizing ***all*** received channels in the input signal much less "digitizing ***all*** received channels in the input signal via a wideband analog-to-digital converter (ADC)." Additionally, the '526 provisional fails to provide any support for digitizing ***prior to*** downconverting, much less "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels" prior to the step of "digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs." To the extent there can be any disclosure to support these limitations, the first disclosure is the limitations of the claims themselves, and the earliest priority date afforded to the '206 patent must be Jan. 28, 2022.

Accordingly, Defendants contend that the '206 patent is not entitled to an earlier priority date based on the '526 provisional application. To the extent Plaintiff asserts an earlier date of invention for the '206 patent, Defendants reserve all rights to respond to that contention and to modify, amend, and/or supplement these Preliminary Invalidity Contentions, including, but not limited to identifying and producing additional prior art. For example, Defendants have identified Motorola SURFBoard SB 6120 system art that was available for public use invalidating the '206 patent if it is not entitled to an earlier

priority date based on the '526 provisional application. *See*, *e.g.*, Exhibit N-29 (charting the '866 patent to SB 6120 System Art).

I. Prior Commercial Use

To the extent that the methods implemented by the accused products are accused of infringing or found to infringe any valid or enforceable claim of the Asserted Patents, Entropic's claims are barred by 35 U.S.C. § 273 because Comcast commercially used this alleged infringing subject matter in the United States at least 1 year before the effective filing date of the Asserted Patents and any purported date on which the claimed invention was disclosed to the public in a manner that qualifies for the exception from prior art under 35 U.S.C. § 102(b). Entropic's infringement allegations appear to encompass techniques that Comcast implemented before Entropic's effective filing date of the Asserted Patents. For example, this applies to at least the '682, '690, '866 and '206 patents, which accuse technologies that Comcast had in commercial production before the effective priority date for the asserted claims. Defendants' investigation is ongoing and Defendants reserve the right to modify, amend, and/or supplement this list.

J. Obviousness Combinations

The particular combinations of prior art references contained herein demonstrating the obviousness of the Asserted Claims under 35 U.S.C. § 103 are exemplary, and not intended to be exhaustive. All such combinations are intended to include and be in view of the knowledge of a person of ordinary skill in the art, as evidenced, for example, by prior art references and other materials produced by Defendants concurrently with these contentions and in the course of ongoing discovery.

Additional obviousness combinations of the identified prior art references are possible, and Defendants reserve the right to use any such combination(s) of the art disclosed in these Preliminary Invalidity Contentions in this litigation. In particular, Defendants are currently unaware of the extent, if any, to which Entropic will contend that limitations of the claims at issue are not disclosed in the art that Defendants have identified as anticipatory, or in the exemplary combinations. To the extent that Entropic

contends that any of the identified anticipatory references or exemplary combinations contains any deficiency, Defendants reserve the right to identify additional evidence that anticipate or render obvious the asserted claims, or additional combinations to render obvious the asserted claims.

K. Additional Prior Art

Discovery and Defendants' investigation, including Defendants' search for prior art, is ongoing. In particular, Defendants request that Entropic identify and produce anything that has been called to Entropic's attention as prior art with respect to the Asserted Patents and documents related to any Preliminary Invalidity Contentions for the patents asserted in this litigation. Defendants reserve the right to supplement, amend, and/or alter the positions taken and information disclosed in these Preliminary Invalidity Contentions if and when Entropic, MaxLinear or a third party produces additional relevant documents, or Defendants' investigation reveals additional relevant information.

To the extent any limitation is construed to have a similar meaning, or to encompass similar feature(s) and/or function(s), with any other claim limitation, and to the extent at least one claim chart in the accompanying claim charts attached hereto identifies any prior art reference as disclosing or teaching such similarly construed claim limitation, such identified prior art reference and Defendants' contentions with respect to same, are incorporated by reference for the other claim limitation.

Defendants further reserve the right to supplement, amend, and/or alter the positions taken and information disclosed in these Preliminary Invalidity Contentions including, without limitation, the prior art and grounds of invalidity set forth herein, to take into account information or defenses that may come to light as a result of Defendants discovery efforts. Defendants hereby incorporate by reference the relevant testimony of any fact witnesses that are deposed, provide declarations, or otherwise testify in this litigation or previously were deposed provided declarations, or otherwise testified in prior litigations regarding the Asserted Patents or patents relating to the

Asserted Patents. Defendants also hereby incorporate by reference the reports and testimony of Defendants expert witnesses regarding invalidity of the Asserted Claims, which will be provided in accordance with the schedule set forth by the Court. Defendants further incorporate by reference the reports and testimony of expert witnesses regarding invalidity of the Asserted Claims, which Entropic has not yet produced.

Defendants also reserve the right to rely upon (1) foreign counterparts of the U.S. Patents identified in Defendants' Preliminary Invalidity Contentions, (2) U.S. counterparts of foreign patents and foreign patent applications identified in Defendants contentions, and (3) U.S. and foreign patents and patent applications corresponding to articles and publications identified in Defendants Preliminary Invalidity Contentions.

To the extent an accused product or feature comprises or arises from prior art,

Defendants contend, without admitting purported infringement, that the Asserted Claims are anticipated and/or made obvious in light of that prior art and Entropic's own infringement allegations.

II. PRELIMINARY INVALIDITY CONTENTIONS

A. Identification of Prior Art

At this time, Defendants contend that at least the following prior art references anticipate under 35 U.S.C. § 102(a), (b), (e), (f) and/or (g) or render obvious under 35 U.S.C. §§ 102 and/or 103, either alone or in combination, the Asserted Claims of the Asserted Patents. The prior art references listed below are exemplary only and disclose or render obvious the elements in the claims of the Asserted Patents. Defendants may also rely on the following prior art references, or any prior art identified in these Preliminary Invalidity Contentions, to show the state of the art and/or knowledge of a person of ordinary skill in the art at the relevant time. For at least the reasons described herein, it would have been obvious to one of ordinary skill in the art to combine each prior art listed in Exhibits M-1 to M-14; Exhibits N-1 to N-29; Exhibits O-1 to O-29; Exhibits P-1 to P-12; Exhibits Q-1 to Q-17; Exhibits R-1 to R-17; Exhibits S-1 to S-14;

Exhibits T-1 to T-29 with any other prior art listed in Exhibit QQ and/or the cover pleading along with the knowledge of one of ordinary skill in the art to arrive at the claims of the Asserted Patents.

Defendants' search for prior art references, additional documentation, and/or corroborating evidence concerning prior art systems and devices is ongoing. Accordingly, Defendants reserve the right to modify, amend, or otherwise supplement its Preliminary Invalidity Contentions (including the prior art listed below and in Ex. QQ) as Defendants obtains additional prior art references, documentation, and/or corroborating evidence concerning invalidity during the course of discovery.

To the extent Plaintiff contends that a particular reference or system identified as prior art in the Accompanying Exhibits and/or the cover pleading does not expressly anticipate an Asserted Claim of an Asserted Patent, Defendants reserve the right to rely on any other prior art reference or system identified in the Accompanying Exhibits and/or the cover pleading to render each and every limitation of an Asserted Claim of an Asserted Patent obvious in light of the prior art. Each prior art reference identified in the tables below either alone or in combination with another reference or system identified in in the Accompanying Exhibits and/or the cover pleading, render one or more Asserted Claims of an Asserted Patent obvious in light of the references' teachings:

B. Whether Each Item of Prior Art Anticipates or Renders Obvious the Asserted Claims

1. Anticipation

List of Prior Art that Anticipates Claims 18 and 19 of the '775 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
R-1	U.S. Patent No. 7,769,046 ("Crocker '046")	U.S.	August 3, 2010 (January 31, 2007)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
R-2	U.S. Pub. No. 2003/0031198 ("Currivan 198")	U.S.	February 13, 2003 (June 20, 2002)
R-3	U.S. Pub. No. 2004/0160945 ("Dong 945")	U.S.	August 19, 2004 (February 13, 2003)
R-4	U.S. Pub. No. 2002/0012347 ("Fitzpatrick 347")	U.S.	January 31, 2002 (April 13, 2001)
R-5	U.S. Pub. No. 2003/0161333 ("Schain 333")	U.S.	August 28, 2003 (August 2, 2002)
R-6	U.S. Pub. No. 2003/0066087 ("Sawyer 087")	U.S.	April 3, 2003 (September 27, 2002)
R-7	System Art – Cisco Router uBR924 ("uBR924")	U.S.	1999[11]
R-8	System Art – Motorola SURFboard Cable Modem SB4220 ("SB4220")	U.S.	2002[12]
R-9	System Art – Motorola SURFboard Cable Modem SB3100 ("SB3100")	U.S.	1999[13]

[11] Based on information currently available to Defendants at this early stage of litigation, the Cisco Router uBR924 was publicly available for use or for sale at least as early as 1996.

[12] Based on information currently available to Defendants at this early stage of litigation, the Motorola SURFboard Cable Modem SB4220 was publicly available for use or for sale at least as early as 2002.

[13] Based on information currently available to Defendants at this early stage of litigation, the Motorola SURFboard Cable Modem SB3100 was publicly available for use or for sale at least as early as 1999.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
R-10	System Art – Motorola SURFboard Cable Modem SB5100 ("SB5100")	U.S.	March 25, 2003[14]
R-11	U.S. Pub. No. 2001/0039600 to Brooks et al. ("Brooks 600")	U.S.	November 8, 2001 (February 16, 2001)
R-12	U.S. Patent App. No. 20020006137 ("Rabenko '137")	U.S.	January 17, 2002 (May 8, 2001)
R-13	U.S. Pub. No. 2002/0061012 to Thi et al. ("Thi 012")	U.S.	May 23, 2002 (September 12, 2001)
R-14	U.S. Pub. No. 20030145332 ("Furuta 332")	U.S.	July 31, 2003 (January 30, 2003)
R-15	U.S. Pub. No. 20020112175 ("Makofka 175")	U.S.	August 15, 2002 (December 13, 2000)
R-16	U.S. Pub. No. 20020091866 ("Perlman 866")	U.S.	July 11, 2002 (January 5, 2001)
R-17	"Requirements for a CableHome Residential Gateway," Texas Instruments ("CableHome")	U.S.	August 2002

List of Prior Art that Anticipates Claims 1, 7, and 8 of the '690 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
Q-1	U.S. Pub. No. 2007/0047492 ("Kim 492")	U.S.	March 1, 2007 (August 29, 2006)
Q-2	U.S. Pub. No. 2012/0106452 ("Kneckt 452")	U.S.	May 3, 2012 (April 21, 2009)

[14] Based on information currently available to Defendants at this early stage of litigation, the Motorola SURFboard Cable Modem SB5100 was publicly available for use or for sale at least as early as March 25, 2003.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
Q-3	U.S. Pub. No. 2005/0088980 ("Olkkonen 980")	U.S.	April 28, 2005 (November 3, 2004)
Q-4	U.S. Pub. No. 2005/0171720 ("Olson 720")	U.S.	August 4, 2005 (January 28, 2004)
Q-5	U.S. Patent No. 7,895,632 ("Sadja 632")	U.S.	February 22, 2011 (January 18, 2005)
Q-6	U.S. Pub. No. 2008/0298333 ("Seok 333")	U.S.	December 4, 2008 (May 30, 2008)
Q-7	U.S. Pub. No. 2008/0304427 ("Biswas 427")	U.S.	December 11, 2008 (February 28, 2008)
Q-8	DOCSIS 3.0 ("DOCSIS 3.0") (including all pertinent revisions)	U.S.	As early as August 4, 2006
Q-9	IEEE Std 802.11-2007 ("IEEE Std 802.11-2007")	U.S.	June 12, 2007
Q-10	International Patent App. Pub. No. WO 2009044382 ("Malik 382")	PCT	April 9, 2009 (October 3, 2008)
Q-11	U.S. Patent No. 6,570,915 ("Sweitzer 915")	U.S.	May 27, 2003 (July 31, 2000)
Q-12	U.S. Pub. No. 2008/0198826 ("Won 826")	U.S.	August 21, 2008 (February 21, 2008)
Q-13	U.S. Pub. No. 20100202422 ("Govindan '422")	U.S.	August 12, 2010 (December 28, 2005)
Q-14	U.S. Patent App. Pub. No. 20070139199 ("Hanlon '199")	U.S.	June 21, 2007 (November 29, 2006)
Q-15	U.S. Pub. No. 20060223574 ("Chandra 574")	U.S.	October 5, 2006 (November 21, 2005)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
Q-16	U.S. Patent No. 6,940,843 ("Goodall 843")	U.S.	September 6, 2005 (November 3, 2003)
Q-17	JP Pub. No. 2006186616 ("Toshimitsu 616")	JP	July 13, 2006 (December 27, 2004)

List of Prior Art that Anticipates Claims 1-6 and 9-10 the '008 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
M-1	U.S. Patent No. 5,874,992 ("Caporizzo 992")	U.S.	February 23, 1999 (August 16, 1996)
M-2	U.S. Pub. No. 20070286311 ("Coyne 311")	U.S.	December 13, 2007 (May 1, 2007)
M-3	U.S. Patent No. 7,403,486 ("Flask 486")	U.S.	July 22, 2008 (November 1, 2004)
M-4	U.S. Patent No. 9,686,594 ("Gomez 594")	U.S.	June 20, 2017 (March 30, 2012)
M-5	U.S. Pub. No. 2009/0128708 ("Huffman 708")	U.S.	May 21, 2009 (November 21, 2007)
M-6	U.S. Pub No. 2005/0114879 ("Kamieniecki 879")	U.S.	May 26, 2005 (November 20, 2003)
M-7	U.S. Pub. No. 2010/0253557 ("Kidambi 557")	U.S.	October 7, 2010 (January 21, 2010)
M-8	U.S. Patent No. 5,808,671 ("Maycock 671")	U.S.	September 15, 1998 (November 22, 1995)
M-9	U.S. Pub. No. 2011/0105068 ("Reddy 068")	U.S.	May 5, 2011 (April 19, 2010)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
M-10	U.S. Patent No. 8,649,421 ("Renken 421")	U.S.	February 11, 2014 (February 17, 2012)
M-11	U.S. Pub. No. 2008/0260044 ("Yun 044")	U.S.	October 23, 2008 (May 20, 2008)
M-12	U.S. Patent No. 7,394,871 ("Zhang 871")	U.S.	July 1, 2008 (January 21, 2004)
M-13	European Patent App. Pub. No. 2,131,542 ("Stadelmeier 542")	E.P.	January 1, 2014 (June 13, 2008)
M-14	U.S. Patent No. 7,649,954 to Walton et al. ("Walton 954")	U.S.	January 19, 2010 (June 30, 2006)

List of Prior Art that Anticipates Claims 11 and 12 of the '362 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
O-1	U.S. Patent No. 5,535,240 ("Carney 240")	U.S.	July 9, 1996 (October 29, 1993)
O-2	U.S. Patent No. 7,522,901 ("Dauphinee 901")	U.S.	April 21, 2009 (September 29, 2004)
O-3	"An Embedded 65nm CMOS Low-IF 48MHz-to-1GHz Dual Tuner for DOCSIS 3.0" ("Gatta")	U.S.	February 08-12, 2009[15]

[15] Gatta was disclosed at a conference held between February 8, 2009 – February 12, 2009. *See* https://ieeexplore.ieee.org/document/4977338. Gatta was also disclosed in the article "An embedded 65 nm CMOS baseband IQ 48 MHz-1 GHz dual tuner for DOCSIS 3.0[1]," Francesco Gatta et al., published in the IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 44, NO. 12, DECEMBER 2009.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
O-4	U.S. Patent No. 7,685,217 ("Jensen 217")	U.S.	March 23, 2010 (July 26, 2005)
O-5	U.S. Patent No. 8,902,369 ("Pugel 369") (filed as international patent application PCT/US2006/023664)	U.S.	December 2, 2014 (Intl. app. published on December 21, 2007)
O-6	U.S. Pub. No. 2008/0261638 ("Wahab '638")	U.S.	October 23, 2008 (April 23, 2007)
O-7	U.S. Pub. No. 2008/0100753 ("Wang '753")	U.S.	May 1, 2008 (October 25, 2007)
O-8	U.S. Patent No. 7,394,871 ("Zhang 871")	U.S.	July 1, 2008 (January 21, 2004)
O-9	U.S. Pub. No. 2010/0061432 ("Ben-Hamo 432")	U.S.	March 11, 2010 (September 11, 2008)
O-10	European Patent App. EP0696854A1 ("Boie 854")	E.P.	February 14, 1996 (July 29, 1995)
O-11	U.S. Patent No. 7,496,158 ("Fudge '158")	U.S.	February 24, 2009 (October 11, 2005)
O-12	U.S. Pub. 2007/0081617 ("Fudge '617")	U.S.	April 12, 2007 (October 11, 2005)
O-13	U.S. Pub. No. 2003/0228855 ("Herz 855")	U.S.	December 11, 2003 (March 10, 2003)
O-14	U.S. Pub. No. 2005/0190777 ("Hess '777")	U.S.	September 1, 2005 (June 29, 2004)
O-15	U.S. Patent No. 5,280,636 ("Kelley 636")	U.S.	January 18, 1994 (June 13, 1991)
O-16	U.S. Pub. No. 2007/0091212 ("Lee 212")	U.S.	April 26, 2007 (October 20, 2006)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
O-17	U.S. Pub. No. 2009/0290659 ("Petrovic 659")	U.S.	November 26, 2009 (March 31, 2009)
O-18	U.S. Patent No. 6,334,051 ("Tsurumi '051")	U.S.	December 25, 2001 (March 4, 1999)
O-19	U.S. Pub. No. 2008/0225175 ("Shyshkin 175")	U.S.	September 18, 2008 (March 4, 2008)
O-20	System Art – Broadcom BCM 3380 ("BCM 3380")	U.S.	June 10, 2008[16]
O-21	WO 2006/119490 ("McNeely 490")	PCT	November 9, 2006 (May 4, 2006)
O-22	Silicon-Based RF Front-Ends for Ultra Wideband Radios ("UWB textbook")	U.S.	January 2008
O-23	U.S. Patent App. Pub. No. 2008/0186409 ("Kang 409")	U.S.	August 7, 2008 (September 25, 2007)
O-24	U.S. Patent No. 7,027,520 ("Pugel 520")	U.S.	April 11, 2006 (August 30, 2001)
O-25	U.S. Pub. No. 2004/0001688 A1 ("Shen 688")	U.S.	January 1, 2004 (June 27, 2002)
O-26	U.S. Patent No. 7,265,792 ("Favrat 792")	U.S.	September 4, 2007 (July 1, 2004)
O-27	U.S. Pub. No. 2007/0098089 ("Li 089")	U.S.	May 3, 2007 (October 28, 2005)
O-28	U.S. Patent App. Pub. No. 2006/0083335 ("Seendripu 335")	U.S.	April 20, 2006 (October 12, 2005)

[16] This constitutes the date that the system art was available for public use. *See* http://datasheet.elcodis.com/pdf/48/45/484522/bcm3380dkfsbg.pdf.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
O-29	System Art – Motorola SURFboard Cable Modem SB6120 ("SB6120")	U.S.	2007[17]

List of Prior Art that Anticipates 27-28, 33, 36-37, 41-42, 47, and 50-51 of the '866 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
T-1	U.S. Patent No. 5,535,240 ("Carney 240")	U.S.	July 9, 1996 (October 29, 1993)
T-2	U.S. Patent App. No. 7,522,901 ("Dauphinee 901")	U.S.	April 21, 2009 (September 29, 2004)
T-3	"An Embedded 65nm CMOS Low-IF 48MHz-to-1GHz Dual Tuner for DOCSIS 3.0" ("Gatta")	U.S.	February 08-12, 2009[18]
T-4	U.S. Pub. No. 2008/0261638 ("Wahab '638")	U.S.	October 23, 2008 (April 23, 2007)
T-5	U.S. Pub. No. 2008/0100753 ("Wang '753")	U.S.	May 1, 2008 (October 25, 2007)
T-6	U.S. Patent No. 7,394,871 ("Zhang 871")	U.S.	July 1, 2008 (January 21, 2004)

[17] SB6120 includes the Texas Instruments TNETC4830 chipset. Upon information and belief, TNETC4830 was released in 2007. *See*, *e.g.*, https://www.eetimes.com/dsp-based-cable-modem-chipsets-support-docsis-3-0/.

[18] Gatta was disclosed at a conference held between February 8, 2009 – February 12, 2009. *See* https://ieeexplore.ieee.org/document/4977338. Gatta was also disclosed in the article "An embedded 65 nm CMOS baseband IQ 48 MHz-1 GHz dual tuner for DOCSIS 3.0[1]," Francesco Gatta et al., published in the IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 44, NO. 12, DECEMBER 2009.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
T-7	U.S. Pub. No. 2010/0061432 ("Ben-Hamo 432")	U.S.	March 11, 2010 (September 11, 2008)
T-8	European Patent App. EP0696854A1 ("Boie 854")	E.P.	February 14, 1996 (July 29, 1995)
T-9	U.S. Patent No. 7,496,158 ("Fudge '158")	U.S.	February 24, 2009 (October 11, 2005)
T-10	U.S. Pub. 2007/0081617 ("Fudge '617")	U.S.	April 12, 2007 (October 11, 2005)
T-11	U.S. Pub. No. 2003/0228855 ("Herz 855")	U.S.	December 11, 2003 (March 10, 2003)
T-12	U.S. Pub. No. 2005/0190777 ("Hess '777")	U.S.	September 1, 2005 (June 29, 2004)
T-13	U.S. Pub. No. 2008/0186409 ("Kang 409")	U.S.	August 7, 2008 (September 5, 2007)
T-14	U.S. Patent No. 5,280,636 ("Kelley 636")	U.S.	January 18, 1994 (June 13, 1991)
T-15	U.S. Pub. No. 2007/0091212 ("Lee 212")	U.S.	April 26, 2007 (October 20, 2006)
T-16	U.S. Pub. No. 2009/0290659 ("Petrovic 659")	U.S.	November 26, 2009 (March 31, 2009)
T-17	U.S. Patent No. 8,902,369 ("Pugel 369") (filed as international patent application PCT/US2006/023664)	U.S.	December 2, 2014 (Intl. app. published on December 21, 2007)
T-18	U.S. Pub. No. 2008/0225175 ("Shyshkin 175")	U.S.	September 18, 2008 (March 4, 2008)
T-19	U.S. Patent No. 6,334,051 ("Tsurumi '051")	U.S.	December 25, 2001 (March 4, 1999)
T-20	System Art – Broadcom BCM 3380 ("BCM 3380")	U.S.	June 10, 2008[7]
T-21	WO 2006/119490 ("McNeely 490")	PCT	November 9, 2006 (May 4, 2006)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
T-22	Silicon-Based RF Front-Ends for Ultra Wideband Radios ("UWB textbook")	U.S.	January 2008
T-23	U.S. Patent No. 7,027,520 ("Pugel 520")	U.S.	April 11, 2006 (August 30, 2001)
T-24	U.S. Pub. No. 2004/0001688 A1 ("Shen 688")	U.S.	January 1, 2004 (June 27, 2002)
T-25	WO 2006/118722 Al ("Virag 722")	PCT	November 9, 2006 (March 29, 2006)
T-26	U.S. Patent No. 7,265,792 ("Favrat 792")	U.S.	September 4, 2007 (July 1, 2004)
T-27	U.S. Pub. No. 2007/0098089 ("Li 089")	U.S.	May 3, 2007 (October 28, 2005)
T-28	U.S. Patent App. Pub. No. 2006/0083335 ("Seendripu 335")	U.S.	April 20, 2006 (October 12, 2005)
T-29	System Art – Motorola SURFboard Cable Modem SB6120 ("SB6120")	U.S.	2007[19]

List of Prior Art that Anticipates
13-14, 19, 21, 23, 25-26, 31, 34-35, 38-39, 44, and 47-48 of the '206 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
N-1	U.S. Patent No. 5,535,240 ("Carney 240")	U.S.	July 9, 1996 (October 29, 1993)
N-2	U.S. Patent No. 7,522,901 ("Dauphinee 901")	U.S.	April 21, 2009 (September 29, 2004)

[19] SB6120 includes the Texas Instruments TNETC4830 chipset. Upon information, TNETC4830 was released in 2007.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
N-3	"An Embedded 65nm CMOS Low-IF 48MHz-to-1GHz Dual Tuner for DOCSIS 3.0" ("Gatta")	U.S.	February 08-12, 2009[20]
N-4	U.S. Patent No. 7,685,217 ("Jensen 217")	U.S.	August 23, 1904 (December 6, 1898)
N-5	U.S. Patent No. 8,902,369 ("Pugel 369") (filed as international patent application PCT/US2006/023664)	U.S.	December 2, 2014 (Intl. app. published on December 21, 2007)
N-6	U.S. Pub. No. 2008/0261638 ("Wahab '638")	U.S.	October 23, 2008 (April 23, 2007)
N-7	U.S. Pub. No. 2008/0100753 ("Wang '753")	U.S.	May 1, 2008 (October 25, 2007)
N-8	U.S. Patent No. 7,394,871 ("Zhang 871")	U.S.	July 1, 2008 (January 21, 2004)
N-9	U.S. Pub. No. 2010/0061432 ("Ben-Hamo 432")	U.S.	March 11, 2010 (September 11, 2008)
N-10	European Patent App. EP0696854A1 ("Boie 854")	E.P.	February 14, 1996 (July 29, 1995)
N-11	U.S. Patent No. 7,496,158 ("Fudge '158")	U.S.	February 24, 2009 (October 11, 2005)
N-12	U.S. Pub. No. 2007/0081617 ("Fudge '617")	U.S.	April 12, 2007 (October 11, 2005)
N-13	U.S. Pub. No. 2003/0228855 ("Herz 855")	U.S.	December 11, 2003 (March 10, 2003)

[20] Gatta was disclosed at a conference held between February 8, 2009 – February 12, 2009. *See* https://ieeexplore.ieee.org/document/4977338. Gatta was also disclosed in the article "An embedded 65 nm CMOS baseband IQ 48 MHz-1 GHz dual tuner for DOCSIS 3.0[1]," Francesco Gatta et al., published in the IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 44, NO. 12, DECEMBER 2009.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
N-14	U.S. Pub. No. 2005/0190777 ("Hess '777")	U.S.	September 1, 2005 (June 29, 2004)
N-15	U.S. Pub. No. 2008/0186409 ("Kang 409")	U.S.	August 7, 2008 (September 25, 2007)
N-16	U.S. Patent No. 5,280,636 ("Kelley 636")	U.S.	January 18, 1994 (June 13, 1991)
N-17	U.S. Pub. No. 2007/0091212 ("Lee 212")	U.S.	April 26, 2007 (October 20, 2006)
N-18	U.S. Pub. No. 2009/0290659 ("Petrovic 659")	U.S.	November 26, 2009 (March 31, 2009)
N-19	U.S. Patent No. 6,334,051 ("Tsurumi '051")	U.S.	December 25, 2001 (March 4, 1999)
N-20	U.S. Pub. No. 2008/0225175 ("Shyshkin 175")	U.S.	September 18, 2008 (March 4, 2008)
N-21	System Art – Broadcom BCM 3380 ("BCM 3380")	U.S.	June 10, 2008[7]
N-22	WO 2006/119490 ("McNeely 490")	PCT	November 9, 2006 (May 4, 2006)
N-23	Silicon-Based RF Front-Ends for Ultra Wideband Radios ("UWB textbook")	U.S.	January 2008
N-24	U.S. Pub. No. 2004/0001688 ("Shen 688")	U.S.	January 1, 2004 (June 27, 2002)
N-25	WO 2006/118722 ("Virag 722")	PCT	November 9, 2006 (March 29, 2006)
N-26	U.S. Patent No. 7,265,792 ("Favrat 792")	U.S.	September 4, 2007 (July 1, 2004)
N-27	U.S. Pub. No. 2007/0098089 ("Li 089")	U.S.	May 3, 2007 (October 28, 2005)
N-28	U.S. Pub. No. 2006/0083335 ("Seendripu 335")	U.S.	April 20, 2006 (October 12, 2005)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
N-29	System Art – Motorola SURFboard Cable Modem SB6120 ("SB6120")	U.S.	2007[21]

List of Prior Art that Anticipates Claims 1-4, 6, and 8-9 of the '826 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
S-1	U.S. Pub. No. 2010/0253557 ("Kidambi 557")	U.S.	October 7, 2010 (January 21, 2010)
S-2	U.S. Patent No. 5,874,992 ("Caporizzo 992")	U.S.	February 23, 1999 (August 16, 1996)
S-3	U.S. Pub. No. 2007/0286311 ("Coyne 311")	U.S.	December 13, 2007 (May 1, 2007)
S-4	U.S. Patent No. 7,403,486 ("Flask 486")	U.S.	July 22, 2008 (November 1, 2004)
S-5	U.S. Patent No. 9,686,594 ("Gomez 594")	U.S.	June 20, 2017 (March 30, 2012)
S-6	U.S. Pub. No. 2009/0128708 ("Huffman 708")	U.S.	May 21, 2009 (November 21, 2007)
S-7	U.S. Pub. No. 2011/0105068 ("Reddy 068")	U.S.	May 5, 2011 (April 19, 2010)
S-8	U.S. Patent No. 8,649,421 ("Renken 421")	U.S.	February 11, 2014 (February 17, 2012)
S-9	U.S. Pub. No. 2008/0260044 ("Yun 044")	U.S.	October 23, 2008 (May 20, 2008)

[21] SB6120 includes the Texas Instruments TNETC4830 chipset. Upon information, TNETC4830 was released in 2007.

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
S-10	U.S. Patent No. 7,394,871 ("Zhang 871")	U.S.	July 1, 2008 (January 21, 2004)
S-11	U.S. Pub. No. 2005/0114879 (Kamieniecki 879)	U.S.	May 26, 2005 (November 20, 2003)
S-12	U.S. Patent No. 5,808,671 ("Maycock 671")	U.S.	September 15, 1998 (November 22, 1995)
S-13	European Patent App. Pub. No. 2,131,542 ("Stadelmeier 542")	E.P.	January 1, 2014 (June 13, 2006)
S-14	U.S. Patent No. 7,649,954 ("Walton 954")	U.S.	January 19, 2010 (June 30, 2006)

List of Prior Art that Anticipates Claims 1-4, 5, and 9 of the '682 Patent

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
P-1	U.S. Pub. No. 2004/0085987 ("Gross 987")	U.S.	May 6, 2004 (August 7, 2003)
P-2	U.S. Pub. No. 2012/0269242 ("Prodan 242")	U.S.	October 25, 2012 (December 30, 2011)
P-3	U.S. Pub. No. 2009/0219856 ("Richardson 856")	U.S.	September 3, 2009 (March 3, 2008)
P-4	U.S. Pub. No. 2013/0041990 ("Thibeault 990")	U.S.	February 14, 2013 (August 11, 2011)
P-5	U.S. Pub. No. 2005/0122996 ("Azenkot 996")	U.S.	June 9, 2005 (December 6, 2003)
P-6	U.S. Pub. No. 2007/0223512 ("Cooper 512")	U.S.	September 27, 2007 (March 23, 2007)

Ex. #	Reference	Country	Issue/Publ. Date (Filing Date)
P-7	U.S. Pub. No. 2005/0097617 ("Currivan 617")	U.S.	May 5, 2005 (November 13, 2004)
P-8	DOCSIS 3.0 ("DOCSIS 3.0") (including all pertinent revisions)	U.S.	At least as early as August 4, 2006
P-9	U.S. Patent App. Pub. No. 2005/0111535 ("Saey 535")	U.S.	May 26, 2005 (March 3, 2004)
P-10	U.S. Patent No. 9,647,786 ("Hanks 786")	U.S.	May 9, 2017 (December 27, 2013)
P-11	U.S. Pub. No. 20040151108 ("Claret 108")	U.S.	August 5, 2004 (November 25, 2008)
P-12	U.S. Pub. No. 20080291840 ("Cooper 840")	U.S.	November 27, 2008 (May 22, 2007)

2. Obviousness

No Asserted Claim goes beyond combining known elements to achieve predictable results or does more than choose between clear alternatives known to those of skill in the art. Thus, to the extent that an Asserted Claim is not anticipated, it is nevertheless invalid as obvious. Specifically, Defendants assert that under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims as set forth by Plaintiff in its Complaint and Infringement Contentions, the Asserted Claims are also invalid as obvious over the following non-exhaustive exemplary combination of references.

The combinations of references provided herein are exemplary and are not intended to be exhaustive. Additional obviousness combinations of the references identified here are possible, and Defendants may rely on such combination(s) in this litigation and/or litigations concerning the Asserted Patents and/or related patents. Moreover, the motivation to combine refences set forth herein are exemplary and Defendants may rely on additional motivation to combine references in this litigation. For example, a POSITA's motivation to combine any of the references laid out in *inter partes* review proceedings and/or *ex partes* reexamination involving the Asserted Patents or related patents, if any, that a requestor may file or that the PTO may grant.

Motivations to combine, as well as the general state of the art, may be found in a variety of places, including in the references defined above, and the specification of the Asserted Patents. For example, multiple prior art references relate to the design and/or structure and/or function relating to wideband technology, the use of demodulators and analog-to-digital converters. A person of ordinary skill in the art at the time of the alleged invention would have been motivated to combine any one piece of identified prior art with any other identified piece of prior art. For at least this reason, it would have been obvious to a person of skill in the art at the time of the alleged invention of the Asserted Claims to combine the various references cited herein so as to practice the Asserted Claims, and there is a motivation in the art to make such a combination.

Motivations to combine various prior art references are present in the references themselves, the common knowledge of one of ordinary skill in the art, the prior art as a whole, or the nature of the problems allegedly addressed by the Asserted Patents. Further reasons to combine the references identified in these charts include the nature of the problem being solved, the express, implied, and/or inherent teachings of the prior art, the knowledge of persons of ordinary skill in the art, the fact that the prior art is generally directed towards methods and systems for the design and/or structure and/or function of telephony systems that such combinations would have yielded predictable results, and that such combinations would have represented known alternatives to a person of ordinary skill in the art.

In *KSR International Co. v. Teleflex, Inc*., the United States Supreme Court held that, among other things, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." 127 S. Ct. 1727, 1739 (2007); *see also id*. at 1731 ("[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions."). In particular, a patent is obvious where "the content of the prior art, the scope of the patent claim, and the level of ordinary skill are not in material dispute, and the obviousness of the claim is apparent in light of these factors." *Id*. at 1745–46. The Supreme Court found that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id*. at 1731.

Moreover, the Supreme Court recognizes that market pressures will motivate a person of ordinary skill to survey known art for solutions to problems. *Id*. at 1732 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp."). When

a person of ordinary skill uses an identified, predictable solution to solve a problem, "it is likely the product not of innovation but of ordinary skill and common sense." *Id*.

In addition, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *Id*. at 1740. If a person of ordinary skill can implement a predictable variation, 35 U.S.C. § 103 bars its patentability. Id. The rationale to combine or modify prior art references is significantly stronger when references seek to solve similar problems, come from the same field, and correspond well. *In re Inland Steel* Co., 265 F.3d 1354, 1362 (Fed. Cir. 2001).

Although the law does not require evidence of motivation to combine, motivation exists to combine one or more of the references disclosed herein with each other. In addition to the specific motivations identified herein, motivation to modify a particular reference or to combine any two or more of the identified references comes from (a) the nature of the problem being solved, (b) the teachings of the prior art, (c) the knowledge of persons of ordinary skill in the art, (d) the fact that all of the references teach systems, apparatuses, and methods related to the subject matter and address the same technical issues described in the Asserted Patents, and (e) considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility, to combine the various teachings. Additionally, one would be motivated to address the alleged problems or achieve the purported objectives identified in the Background sections of the Asserted Patents.

To the extent not anticipated, the Asserted Claims represent no more than the result of ordinary innovation over the prior art. Moreover, no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. See *KSR*, 127 S. Ct. at 1739–40 (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive

and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton," and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id*. at 1742. Nevertheless, in addition to the information contained in the section immediately above and elsewhere in these contentions, additional motivation and reason to combine the cited art are identified. A person having ordinary skill in any or all of these fields would be aware of all prior art in those fields, including but not limited to the identified prior art references and systems, and would have been motivated to combine the teachings of prior art with the field.

In sum, motivations to modify or combine the identified references including the references listed above can be found via, for example, discussions in the cited references, the state of the art discussed in the references, and the knowledge of one of ordinary skill in the art. One of ordinary skill in the art would have been motivated to combine these references, because these references relate to common objectives and subject matter. The references share commonalities in terms of their general subject matter as well as the types of equipment, products, systems, and/or methods used. Further, the prior art references explicitly or implicitly reference other prior art references, share common authors or inventors, were published in the same journals, were compiled by a common author of a compilation or reference book, were presented at the same conferences, and/or were developed at common companies, schools, or organizations, which would motivate one of skill in the art to combine them. These references are within the field of the Asserted Patents and are directed to similar subject matter within the field. Additionally, the references, and any products, devices, or processes described in the references, existed and/or were invented in the same time period, providing further motivation for combination. These disclosures were provided without prejudice to any arguments or objections concerning the relevance of motivation to combine in connection with any invalidity contentions.

Defendants reserve the right to further specify the motivations to combine the prior art in response to positions that Plaintiff may take later in this case and as discovery, including third-party discovery, proceeds. Defendants may rely on any and all portions of the prior art, other documents, and expert testimony to establish that a person of ordinary skill in the art would have been motivated to modify or combine the prior art so as to render the claims invalid as obvious. Moreover, Defendants reserve the right to rely on later identified sources of information, including but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patents.

Furthermore, Defendants are currently unaware of Plaintiff's allegations with respect to the level of skill in the art and the qualifications of the typical person of ordinary skill in the art. Defendants are also unaware of the extent, if any, to which Plaintiff may contend that limitations of the claims at issue are not disclosed in the prior art identified by Defendants as anticipatory, and the extent to which Plaintiff will contend that elements not disclosed in the asserted patent specifications would have been known to persons of skill in the art. And Defendants do not yet know how the Court will construe terms in the Asserted Claims. Defendants are also continuing its investigation of the large universe of prior art to identify potential prior art systems (including devices and communication protocols running on such devices), publications related to those systems, and third parties that may have information about those systems. Plaintiff may also be in possession of prior art that Defendants may receive after discovery opens in this case. Defendants reserve the right to amend and supplement these contentions to identify other prior art and combinations rendering the Asserted Claims obvious.

While Defendants reserve the right to rely on any combination of the references reflected in their charts or incorporated herein by reference, Defendants provides exemplary and non-exhaustive references and/or combinations herein evidencing invalidity of the claims of the Asserted Patents in the charts produced as Accompanying

Exhibits. The combinations of prior art listed herein render obvious the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims as set forth by Plaintiff in its Complaint and Infringement Contentions.

First, one of skill in the art would have been motivated to combine one or more of: (i) the general state of the art and admitted prior art; and/or (ii) the references identified in the Accompanying Exhibits with one another, because they all relate to common objectives and subject matter. The references share commonalities in terms of their general subject matter, (e.g., TV tuners used in cable modems, channelizer, signal monitors, data processor, analog-to-digital conversion, demodulators, serial interface, chipsets implementing the DOCSIS standard, cable modems (CMs), cable modem termination systems (CMTS), measuring SNRs across subcarriers for multicarrier communications.) Even the context in which these functionalities were provided—cable TV systems—was well-known. *See*, *e.g.*, U.S. Patent No. 7,394,871 to Zhang ("Zhang 871"), which discloses that the source of Zhang's multi-channel analog RF signal includes satellite systems, terrestrial TV systems, cable systems, etc. Zhang 871 at 3:15-19, 3:60-63. Moreover, a person of ordinary skill would have been motivated to combine the above prior art based on the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. With respect to the '362, '206, and '866 patents, for example, a 2007 blog post identifies that "*[o]ne of the top priorities in this race has been the need for a wideband tuner, one that handles the wide IF bandwidth employed in DOCSIS 3.0* and that delivers the performance necessary to achieve reliable data rates." See, e.g., https://www.edn.com/tuners-for-docsis-3-0-cable-modems/ (emphasis added). The same article also discloses that the "new MicroTuner MT2170 wideband tuner is poised to revolutionize the cable modem industry." *Id*. Thus, a POSITA reading this article would have found it obvious to combine Gatta (which discloses

wideband tuners) with at least the DOCSIS 3.0 Specification and/or chips implementing the DOCSIS 3.0 Specification such as Broadcom's BCM 3380 chip. As another example, with respect to the '362, '206, and '866 patents, a POSITA would have found it obvious to combine US Pat. No. 7,685,217 ("Jensen 217") with US Pat. No. 7,394,871 ("Zhang 871") because these references have similarities in their implementation. For example, both references disclose the downconverting by a mixer claim element. As yet another example, with respect to the '362 patent, US Pub. No. 20090290659 ("Petrovic 659") and U.S. Patent No. 5,924,031 ("Copeland 031") share a commonality in that both teach performing "downconversion" in the analog domain. Thus, a POSITA would have found it natural to combine Petrovic 659 with Copeland 031 in light of this common implementation technique. With respect to the '682 patent, a POSITA would have found it obvious to combine the DOCSIS 3.0 Specification with U.S. Pat. No. 8,031,642 ("Cai 642") because Cai 242's disclosure of determining a "composite SNR" by banding a bunch of subcarriers of the receiving devices together is similar to the teachings of how modems share channels in DOCSIS 3.0. As another example with respect to the '682 patent, a POSITA would have found it obvious to combine U. S. Pub. No. 2013/0041990 ("Thibeault 990") with U.S. Pat. No. 9,647,786 ("Hanks 786") because both relate to similar techniques of using signal quality measurements to group network elements (*e.g.*, cable modems) and set communication protocols (*e.g.*, modulation profiles) based on group channel characteristics. Thus, a POSITA would have been motivated to apply Thibeault's optimization techniques to Hanks' teaching of OFDM optimization to achieve channel optimization on a subcarrier basis for each subcarrier within the spectrum of an associated OFDM channel. As a further example, with respect to the '775 Patent, a POSITA would have been motivated to combine "Requirements for a CableHome Residential Gateway" ("CableHome") with U.S. Pub. No. 2003/0145332 ("Furuta 332"), because both relate to management of DOCSIS cable modems connected to IP networks. With respect to the '690 Patent, as an example, a POSITA would have been motivated to combine U.S. Patent No.

6,940,843 ("Goodall 843") with U.S. Pub. No. 2006/0223574 ("Chandra 574"), as both references relate to determining qualities or characteristics of signals or frequencies in wireless communication systems.

Second, a person of ordinary skill in the art would have understood that the references identified in the Accompanying Exhibits explicitly or implicitly reference other prior art that were published in the same news articles, trade journals, magazines, publications, were presented at the same conferences, were presented as proposals to standards working groups (such as IEEE 802.11 working group, American National Standards Institute (ANSI) meetings, and others), were developed by the same inventor(s), and/or were developed at common companies and/or were developed at common companies. With respect to the '682 patent, for example, prior art references U.S. Pub. No. 2013/0107921 ("Prodan 921") and U.S. Pub. No. 2012/0269242 ("Prodan 242") list Broadcom Inc. as the original assignee and list the same inventor Prodan, which would motivate one of skill in the art to combine them. Also, a POSITA would have found it obvious to combine U.S. Pub. No. 2005/0111535 ("Saey 535") with one or more of U.S. Pub. No. 20050097617 ("Currivan 617") and/or Prodan 242, since all three references are assigned to Broadcom. As another example, with respect to the '362, '206, and '866 patents, a POSITA would find a natural motivation to combine Gatta (which is a Broadcom reference) with one or more of Broadcom's own BCM 3380 chip, and/or US Pat. No. 7,522,901 ("Dauphinee 901"), and/or U.S. Patent No. 8,224,274 ("Gomez 274"), and/or US Pat. No. 7,685,217 ("Jensen 217"), since all of these references are assigned to Broadcom. Additionally, with respect to the '362, '206, and '866 patents, a POSITA would have found it obvious to combine US Pat. No. 8,902,369 ("Pugel 369") with one or more of WO 2006/119490 ("McNeely 490") and/or EP 0696854A1 ("Boie 854") because all three references are assigned to the same entity Thomson Licensing. Similarly, with respect to the '775 patent, U.S. Pub. No. 2002/0061012 ("Thi 012") and U.S. Pub. No. 20030031198 ("Currivan 198") have common assignee Broadcom Corp, and as such, a POSITA would find it

obvious to combine these references. As another example, with respect to the '775 patent, U.S. Pub. No. 20030161333 ("Schain 333") and US Pat. No. 7,127,734 ("Amit 734") have common assignee, Texas Instruments Inc., which would be a motivation to combine these references. As yet another example, with respect to the '775 patent, a POSITA would have found it obvious to combine Motorola SB3100 cable modem and US Pub. No. 20030167373 ("Winters '373") since Winters 373 was assigned to Arris and the Motorola SURFBoard brand was acquired[22] by Arris. With respect to the '008 and '826 patents, a POSITA would have found it obvious to combine US Pub. No. 2005/0114879 ("Kamieniecki 879") with U.S. Pat. No. 5,874,992 ("Caporizzo 992") since they are both assigned to General Instrument Corp.

Third, the references identified in the Accompanying Exhibits, the general state of the art, and the admitted prior art are also directed to similar subject matter within that field. Additionally, any products, devices, or processes (e.g., direct conversion, using OFDM for communications, serial interfaces, using probes to determine channel characteristics, monitoring network parameters) described in the references existed and/or were invented before or during the period in which the claimed inventions were developed, providing further motivation to combine them. For example, the '362¸'866, and '206 patents admit sending a serial or parallel digital data stream to a demodulator "***using a serial or parallel data interface according to commonly known methods***." '362 patent at 6:55-58, emphasis added. The '362¸'866, and '206 patents also admit that, in the context of using N complex mixers for generating digital representations of analog filtered signals, "***[i]t is understood that the number N can be any integer value***." *Id*. at 5:35-36. Further, the '362¸'866, and '206 patents admit that "wideband tuners" were also well-known. *See generally* '362 patent, 1:46-2:23. The '526 provisional (to which the '362 patent claims priority) admits that "convert[ing] the

[22] *See*, e.g., https://arris.my.salesforce-sites.com/consumers/articles/General_FAQs/Motorola-Zoom-ARRIS-Branding-Name (stating "ARRIS acquired Motorola Home in 2013").

signal to the digital domain using the wide band ADC converters ADCI and ADC2" was "***conventional***." '526 provisional at 4, Fig. 1, emphasis added. With respect to the '690 patent, the Specification admits that, in connection with providing a background for conventional systems, "probes are sent between nodes of the network in order to allow a receiving node on the network to determine some of the characteristics of the channel between the receiving node and the transmitting node." '690 patent at 1:49-53. The '008 and '826 patents admit that "[c]onventional methods and apparatuses" were used for "monitoring network parameters." '008 patent at 1:42-45. In addition, the combination of prior art references identified above would have been obvious because the combinations represent known potential options with a reasonable expectation of success. Consider, for example, the well-known technique of stacking multiple digital tuners to implement a wideband digital receiver. Several prior art references disclose this. For example, *see* U.S. Pat. No. 5,590,156 ("Carney 156"), U.S. Pat. No. 7,274,679 ("Amit 679"), U.S. Pat. No. 7,017,176 ("Lee 176") which clearly disclose stacking. A POSITA would have recognized that the teachings of these references can be used with a reference disclosing TV tuners (such as Gatta) to arrive at the invention claimed in the '362, '866, and '206 patents with a reasonable expectation of success.

Fourth, one or more combinations of the general state of the art, the admitted prior art, and prior art references identified in the Accompanying Exhibits would have been obvious because these references would have been combined with one another using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. For example, with respect to the '362, '206, and '866 patents, a POSITA would have found it obvious to combine Gatta's tuner with the teachings of stacking multiple tuners disclosed in one or more of the DOCSIS 3.0 Specification, U.S. Pat. No. 7,017,176 ("Lee 176"), and/or U.S. Pat. No. 7,274,679 ("Amit 679") to arrive at the invention claimed in the '362, '206, and '866 patents. Further, with respect to the '682 patent, a

POSITA would have understood Hanks 786's teaching of implementing the OFDM communication method as a simple substitution of Thibeault 990's TDMA, ATDMA and SCDMA communication methods to obtain the predictable result of optimizing associated OFDM communication channels on a subcarrier basis. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. For example, with respect to the "providing the plurality of digital channel outputs via a serial interface" recited in the '206 patent, a POSITA would have recognized that there were only two ways to output a plurality of digital channels: serial or parallel. Both have known advantages and disadvantages. *See e.g.*, Texas Instruments Application Report SLLA067A ("Comparing Bus Solutions"), Feb. 2004. A POSITA would have found it obvious to choose a serial interface based on the advantages provided by a serial interface such as avoid timing skew, fewer wires, saving board space and power consumption. Picking one or the other would have been an "obvious to try" choice based on limited options, with known predictable results. By way of example, with respect to the '362, '206, and '866 patents, a POSITA would have recognized that were a limited number of alternatives of performing early-stage digitalization of received signals. *See* "The Theory and Practice of Modem Design," John A.C. Bingham, Wiley 1988 ("Bingham") at pp. 166-167 informing of a "five alternatives" for early stage sampling of received signals. Thus, a POSITA reviewing Bingham would have understood how to implement these alternatives and would accordingly be motivated to combine the prior art references relating to early-stage digitization. With respect to the "digital video recorder (DVR)" limitation recited in the '866 and '206 patents, a POSITA would have recognized that it was known to include DVR functionality in a device that receives cable TV signals, e.g., as taught by US Pat. No. 9,113,195 ("Barton 195") and Zhang 871. To the extent that Entropic argues that Zhang 871's PVR (*personal* video recorder)

does not expressly teach a DVR, Zhang 871 teaches a system that has the ability to receive multiple different channels, and it would have been obvious to incorporate Zhang's system into a DVR so that the modified Zhang 871-DVR system can make use of the ability to receive multiple different channels. To the extent that Entropic argues that the Pugel 369 device does not expressly teach a DVR, a POSITA would have found it obvious to implement a DVR in the Pugel 369 device for similar reasons. As yet another example, with respect to the "cable network connector" claim element in the '866 patent, including coax connectors on devices such as STBs and DVRs was well known. *See*, *e.g.*, US Pat. No. 7,946,199 ("Bradley 199") and US Pub. No. 2002/0040475 ("Yap 475"). A POSITA would have recognized that coax connectors are commonly used as "cable network connectors" and would have been included in the Zhang 871 system to allow the Zhang 871 system to receive and subsequently process the RF signals. To the extent that Entropic argues that one or more of the prior art references (such as Pugel 369) charted for the '362, '866, and '206 patents do not expressly disclose "digital downcoversion," Zhang 871, Jensen 217, and Petrovic 659 disclose that limitation. A POSITA would have found it obvious to modify such prior art references in view of one or more of Zhang 871, Jensen 217, and/or Petrovic 659 to bring the signal to baseband and perform channel selection in the digital domain because of the well-known advantages of processing signals in the digital domain.

Fifth, additional evidence that there would have been a motivation to combine the prior art references identified in the Accompanying Exhibits and/or the general state of the art and/or the admitted prior art, includes, for example, the interrelated teachings in the field of TV tuners / set-top boxes of multiple prior art references; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the invention(s); and the background knowledge that would have been

possessed by a POSITA. With respect to the '362 patent, for example, a skilled artisan would have found it obvious to combine the teachings of McNeely 490 with Pugel 369 as doing so would have been no more than the combination of known prior art elements. McNeely 490 and Pugel 369 disclose each and every limitation of the claims, including the claimed "a demodulator." *See*, *e.g.*, Pugel 690 at [0027], McNeely 490, 5:16-21. A POSITA could have, and would have been motivated to combine the teachings of McNeely 490 with those of Pugel 369 to provide for display of the selected TV channels on a display device (e.g., display device 150a-c in McNeely 490). In combination, each element performs the same function as previously: McNeely 490's apparatus downconverts, digitizes, and selects channels, and Pugel provides a demodulator that demodulates the channels for display. Additionally, the results of the combination would have been predictable, as McNeely acknowledges that demodulation was known in the context of its methods. Indeed, the Background of the '362 Patent confirms demodulators as admitted prior art. *See* '362 Patent at 5:27-34. Thus, a POSITA would have combined the teachings of McNeely 490 and Pugel 369. As another example, concerning the '362 patent, a POSITA would have been motivated combine the teachings of Gomez 594 with Pugel 369, because doing so would have been nothing more than the use of a known technique to improve a similar device in the same way. Gomez 594 explicitly teaches the circuitry (i.e., a mixer) to perform the known technique of downconversion. A POSITA would have been motivated to apply this teaching in Gomez 594 of downconversion by a mixer module to the teachings of Pugel 369 to provide the hardware necessary to perform Pugel 369's downconversion. The results would have been predictable to a POSITA, as the results would have simply represented Gomez 594's mixer module performing downconversion in the context of Pugel 369's system that also performs downconversion. Further, with respect to the '362 patent, for example, a skilled artisan would have found it obvious to modify Zhang 871 by replacing the plurality of demodulators in Zhang 871 with prior art references that teach the use of a single component shared by multiple channels, *see e.g.*, US Pat.

No. 7,783,958 ("Eidson 958") teaching a shared iterative decoder for satellite TV, and/or US Pat. No. 6,061,406 ("Carson 406"), teaching a time-shared demodulator for satellite communications. Such a modification would have been motivated, *e.g.*, by the potential to reduce cost by using a simpler modulator that could be time-shared among different channels.

Sixth, a person of ordinary skill at the time of the alleged invention had reason to combine or modify one or more of the references identified in the Accompanying Exhibits and/or the general state of the art, and/or the admitted prior art, in light of the knowledge of a person of ordinary skill in the art at the time of the invention and information in the prior art cited herein. For example, a skilled artisan seeking to create a system for service group management in a cable television network across a plurality of service groups would have recognized that a SNR value is representative of channel quality, and further using a worst-case SNR determined across all service groups would achieve a target Bit Error Rate (BER) or a desired overall BER in a communication network.

The combinations of references provided above are exemplary and are not intended to be exhaustive. Additional obviousness combinations of the references identified here are possible, and Defendant may rely on such combination(s) in this litigation and/or litigations concerning the Asserted Patents and/or related patents. Moreover, the motivation to combine refences set forth herein are exemplary and Defendant may rely on additional motivation to combine references in this litigation. For example, a POSITA's motivation to combine any of the references laid out in *inter partes* review proceedings and *ex partes* proceedings involving the Asserted Patents or related patents, if any, that a requestor may file or the PTO may grant. To the extent Plaintiff challenges a combination of prior art with respect to a particular element, Defendants may supplement these contentions to further specify the motivation to combine the prior art. Defendants may rely on cited or uncited portions of the prior art, other documents, and/or expert testimony to establish that a person of ordinary skill in

the art would have been motivated to modify or combine the prior art so as to render the claims obvious.

The asserted claims of the '775 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Thi 012 and Denney 304
- Thi 012 and Abrishami 673
- Brooks 600 and Denney 304
- Brooks 600 and Abrishami 673
- Schain 333 and Denney 304
- Schain 333 and Abrishami 673
- Rabenko 137 and ASIX Controller System Art
- SB3100 System Art and Winters 373
- SB3100 System Art and Winters 373 and CiM-550 Flash
- SB3100 System Art and ASIX Controller System Art
- uBR924 System Art and Rabenko 137
- uBR924 System Art, Product Brief of BCM3300 System Art, and Overview of MPC850 System Art[23]
- uBR924 System Art, Product Brief of BCM3300 System Art, and ASIX Controller System Art[24]
- Perlman 866 and Furuta 332
- Furuta 332 and CableHome

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts the foregoing combinations do not teach element 18[a],

[23] BCM3300 and MPC850 are included as part of the uBR924 router, which is charted against the '775 patent claims. *See*, *e.g.*, Exhibit R-7.

[24] BCM3300 is included as part of the uBR924 router, which is charted against the '775 patent claims, (*see*, *e.g.*, Exhibit R-7) and ASIX Controller System Art is charted in Exhibit QQ.

the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[b], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[c], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[d], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[e], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[f], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[g], the foregoing

combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[h], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[i], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Denney 304 or Abrishami 673 or Humpleman 874 or Rabenko 137 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Denney 304 or Abrishami 673 or Humpleman 874 or Rabenko 137 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[j], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 18[k], the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Furuta 332 or CableHome are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 19, the foregoing combinations in further combination with any one of uBR924 or Schain 333 or Perlman 866 or Makofka 175 or CableHome (to the extent uBR924 or Schain 333 or Perlman 866 or Makofka 175 or CableHome are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the '682 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Cooper 512 and Saey 535
- Cooper 512, Saey 535, and Kim 385
- Cooper 512, Saey 535, and Richardson 856
- Cooper 512 and Gross 987
- Cooper 512, Gross 987, and Kim 385
- Cooper 512, Gross 987, and Richardson 856
- Cooper 512 and Cioffi 825
- Cooper 512, Cioffi 825, and Kim 385
- Cooper 512, Cioffi 825, and Richardson 856
- Prodan 242 and Saey 535
- Prodan 242, Saey 535, and Kim 385
- Prodan 242, Saey 535, and Richardson 856
- Prodan 242 and Gross 987
- Prodan 242, Gross 987, and Kim 385
- Prodan 242, Gross 987, and Richardson 856
- Prodan 242 and Cioffi 825
- Prodan 242, Cioffi 825, and Kim 385
- Prodan 242, Cioffi 825, and Richardson 856
- Thibeault 990 and Saey 535
- Thibeault 990, Saey 535, and Kim 385
- Thibeault 990, Saey 535, and Richardson 856
- Thibeault 990 and Gross 987
- Thibeault 990, Gross 987, and Kim 385
- Thibeault 990, Gross 987, and Richardson 856
- Thibeault 990 and Cioffi 825
- Thibeault 990, Cioffi 825, and Kim 385

- Thibeault 990, Cioffi 825, and Richardson 856
- Thibeault 990
- Thibeault 990 and Hanks 786
- Prodan 242, Saey 535, and Prodan 921
- DOCSIS 3.0 and Cai 642
- DOCSIS 3.0 and Monk 802
- DOCSIS 3.0 and Bernath 450
- Claret 108 and Cooper 840

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts the foregoing combinations do not teach element 1[c], the foregoing combinations in further combination with any one of Azenkot 996 or Cooper 512 or Monk 802 or Bernath or Dale 976 or Cai 642 or Saey 535 or Cioffi 825 or Claret 108 (to the extent Azenkot 996 or Cooper 512 or Monk 802 or Bernath or Dale 976 or Cai 642 or Saey 535 or Cioffi 825 or Claret 108 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 2, the foregoing combinations in further combination with any one of Rice or Bernath or Claret 108 or Cooper 840 (to the extent Rice or Bernath or Claret 108 or Cooper 840 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 3, the foregoing combinations in further combination with any of Prodan 921 or Monk 802 or Chapman or Kim 385 or Bahai or Gross 987 or Claret 108 (to the extent Prodan 921 or Monk 802 or Chapman or Kim 385 or Bahai or Gross 987 or Claret 108 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 4, the foregoing combinations in further combination with any of Bernath or Chapman or Gross 987 or Wu 512 or Claret 108 (to the extent Bernath or Chapman or Gross 987 or Wu 512 or Claret 108 are not already part of the combination)

would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 5, the foregoing combinations in further combination with any of Van Nee or Chapman or Bernath or Monk 802 or Claret 108 (to the extent Van Nee or Chapman or Bernath or Monk 802 or Claret 108 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 9[a], the foregoing combinations in further combination with any of DOCSIS 3.0 or Monk 802 or Bernath or Sweitzer 915 or Claret 108 (to the extent DOCSIS 3.0 or Monk 802 or Bernath or Sweitzer 915 or Claret 108 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 9[b], the foregoing combinations in further combination with any one of Sweitzer 915 or Olson 143 or Richardson 856 or Claret 108 (to the extent Sweitzer 915 or Olson 143 or Richardson 856 or Claret 108 are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the ’690 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Won 826 and Terry
- Won 826 and Valentin
- Olson 720 and Terry
- Olson 720 and Valentin
- IEEE Std 802.11-2007 and Govindan 422
- IEEE Std 802.11-2007, Govindan 422 and Terry
- IEEE Std 802.11-2007, Govindan 422, and Valentin
- IEEE Std 802.11-2007, Hanlon 199
- IEEE Std 802.11-2007, Hanlon 199, and Terry
- IEEE Std 802.11-2007, Hanlon 199, and Valentin
- DOCSIS 3.0 and IEEE Std 802.11-2007
- Biswas 427 and DOCSIS 3.0

- Biswas 427 and Prodan 242
- Sweitzer 915 and DOCSIS 3.0
- Sweitzer 915 and Prodan 242
- Olsen 720 and DOCSIS 3 .0
- Olsen 720 and IEEE Std 802.11-2007
- Olsen 720 and Prodan 242
- IEEE Std 802.11-2007 and Prodan 242
- IEEE Std 802.11-2007 and Biswas 427
- IEEE Std 802.11-2007 and Sweitzer 915
- Won 826 and DOCSIS 3.0
- Won 826 and Biswas 427
- Won 826 and Olson 720
- Won 826 and Switzer 915
- Toshimitsu 616 and Goodall 843
- Goodall 843 and Chandra 574

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts the foregoing combinations do not teach element 1[a], the foregoing combinations in further combination with any one of DOCSIS 2.0 or Prodan 242 or Terry 703 or Valentin or Toshimitsu 616 (to the extent DOCSIS 2.0 or Prodan 242 or Terry 703 or Valentin or Toshimitsu 616 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[c], the foregoing combinations in further combination with any one of DOCSIS 2.0 or Toshimitsu 616 (to the extent DOCSIS 2.0 or Toshimitsu 616 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 7, the foregoing combinations in further combination with any one of DOCSIS 2.0 or Goodall 843 (to the extent DOCSIS 2.0 or Goodall 843

are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 8, the foregoing combinations in further combination with any one of DOCSIS 2.0 or Goodall 843 (to the extent DOCSIS 2.0 or Goodall 843 are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the '008 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Renken 421
- Renken 421 and Zhang 871
- Kamieniecki 879 and Doris 197
- Maycock 671 and Zhang 871
- Maycock 671 and Kidambi 557
- Maycock 671 and Kamieniecki 879
- Coyne 311 and Petrovic 916
- Coyne 311, Petrovic 916, and Zhang 871
- Renken 421 and Zhang 871
- Renken 421 and Kidambi 557
- Renken 421 and Coyne 311
- Renken 421 and Doris 197
- Renken 421 and Kamieniecki 879
- Renken 421 and Huffman 708
- Renken 421 and Reddy 068
- Renken 421, Coyne 311, and Zhang 871
- Renken 421, Coyne 311, and Kidambi 557
- Renken 421, Coyne 311, and Huffman 708
- Renken 421, Coyne 311, and Gomez 594
- Renken 421, Coyne 311, and Reddy 068
- Renken 421, Doris 197, and Zhang 871

- Renken 421, Doris 197, and Kidambi 557
- Renken 421, Doris 197, and Kamieniecki 879
- Renken 421, Doris 197, and Huffman 708
- Renken 421, Doris 197, and Reddy 068
- Caporizzo 992 and Zhang 871
- Caporizzo 992 and Kidambi 557
- Caporizzo 992 and Doris 197
- Caporizzo 992 and Kamieniecki 879
- Caporizzo 992 and Huffman 708
- Caporizzo 992 and Reddy 068
- Caporizzo 992, Coyne 311, and Zhang 871
- Caporizzo 992, Coyne 311, and Kidambi 557
- Caporizzo 992, Coyne 311, and Kamieniecki 879
- Caporizzo 992, Coyne 311, and Huffman 708
- Caporizzo 992, Coyne 311, and Reddy 068
- Caporizzo 992, Doris 197, and Zhang 871
- Caporizzo 992, Doris 197, and Kidambi 557
- Caporizzo 992, Doris 197, and Kamieniecki 879
- Caporizzo 992, Doris 197, and Huffman 708
- Caporizzo 992, Doris 197, and Reddy 068
- Gomez 593 and Zhang 871
- Gomez 593 and Kidambi 557
- Gomez 593 and Coyne 311
- Gomez 593 and Doris 197
- Gomez 593 and Kamieniecki 879
- Gomez 593 and Huffman 708
- Gomez 593 and Reddy 068
- Gomez 593, Coyne 311, and Zhang 871

- Gomez 593, Coyne 311, and Kidambi 557
- Gomez 593, Coyne 311, and Kamieniecki 879
- Gomez 593, Coyne 311, and Huffman 708
- Gomez 593, Coyne 311, and Reddy 068
- Gomez 593, Doris 197, and Zhang 871
- Gomez 593, Doris 197, and Kidambi 557
- Gomez 593, Doris 197, and Kamieniecki 879
- Gomez 593, Doris 197, and Huffman 708
- Gomez 593, Doris 197, and Reddy 068
- Kamieniecki 879 and Doris 197
- Kamieniecki 879 and Coyne 311
- Kamieniecki 879 and Caporizzo 992
- Stadelmeier 542 and Zhang 871
- Stadelmeier 542 and Kidambi 557
- Stadelmeier 542 and Coyne 311

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts the foregoing combinations do not teach element 1[a], the foregoing combinations in further combination with any one of Carney 240 or Sadia 995 or Yu 091 or Chen 010 or Pugel 520 or Chen 760 or BCN4528 Chip or Zhang 871 or Kidambi 557 or Doris 197 (to the extent are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[c], the foregoing combinations in further combination with any one of Sadia 995 or Yu 091 or Chen 010 or Super Buddy or Lee 176 or Cavanagh 044 or Coyne 311 or Petrovic 916 or Tang 191 or Velazquez 694 (to the extent Sadia 995 or Yu 091 or Chen 010 or Super Buddy or Lee 176 or Cavanagh 044 or Coyne 311 or Petrovic 916 or Tang 191 or Velazquez 694 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic

asserts the foregoing combinations do not teach element 1[d], the foregoing combinations in further combination with any one of Sadia 995 or Yu 091 or Chen 010 or Super Buddy or Renken 421 or Petrovic 916 or ETSI EN 301 790 V1.5.1 or ETSI EN 302 307 V1.2.1 or ETSI ER 101 790 V1.4.1 or ETSI TR 102 376 V1.1.1 or Morello or DiSEqC or ITU Handbook on Spectrum Monitoring or ITU Handbook on Satellite Communications (3d ed.) or Carney 240 (to the extent Sadia 995 or Yu 091 or Chen 010 or Super Buddy or Renken 421 or Petrovic 916 or ETSI EN 301 790 V1.5.1 or ETSI EN 302 307 V1.2.1 or ETSI ER 101 790 V1.4.1 or ETSI TR 102 376 V1.1.1 or Morello or DiSEqC or ITU Handbook on Spectrum Monitoring or ITU Handbook on Satellite Communications (3d ed.) or Carney 240 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[e], the foregoing combinations in further combination with any one of Carney 240 or Yu 091 or Chen 010 or Pugel 520 or BCM4528 Chip or Coyne 311 or Skelly 049 (to the extent Carney 240 or Yu 091 or Chen 010 or Pugel 520 or BCM4528 Chip or Coyne 311 or Skelly 049 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[g], the foregoing combinations in further combination with any one of Carney 240 or Pugel 520 or BCM4528 Chip or Sadia 095 or Renken 421 or Coyne 311 (to the extent Carney 240 or Pugel 520 or BCM4528 Chip or Sadia 095 or Renken 421 or Coyne 311 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[h], the foregoing combinations in further combination with any one of Carney 240 or Sadia 995 or Pugel 520 or Renken 421 (to the extent Carney 240 or Sadia 995 or Pugel 520 or Renken 421 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[i], the foregoing combinations in further combination with any one of Carney 240 or Sadia 995 or Chen 010 or Pugel 520 or Super Buddy or Lee 176 or Chen 760 or BCM4528 or

Renken 421 or Coyne 311 (to the extent Carney 240 or Sadia 995 or Chen 010 or Pugel 520 or Super Buddy or Lee 176 or Chen 760 or BCM4528 Renken 421 or Coyne 311 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 2, the foregoing combinations in further combination with any one of Carney 240 or Yu 091 or Chen 010 or Pugel 520 or Super Buddy or Lee 176 or Chen 760 or BCM4528 or Zhang 871 or Yun 044 (to the extent Carney 240 or Yu 091 or Chen 010 or Pugel 520 or Super Buddy or Lee 176 or Chen 760 or BCM4528 or Zhang 871 or Yun 044 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 5, the foregoing combinations in further combination with any one of Sadia 995 or Yu 091 or Chen 010 or Super Buddy or Lee 176 or Petrovic 916 or Narita 888 (to the extent Sadia 995 or Yu 091 or Chen 010 or Super Buddy or Lee 176 or Petrovic 916 or Narita 888 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 6, the foregoing combinations in further combination with Zhang 871 (to the extent Zhang 871 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 9, the foregoing combinations in further combination with any of Yu 091 or Chen 010 or Zhang 871 (to the extent Yu 091 or Chen 010 or Zhang 871 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 10, the foregoing combinations in further combination with any of Chen 760 or BCM4528 or Renken 421 or Doris 197 (to the extent Chen 760 or BCM4528 or Renken 421 or Doris 197 are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the ’826 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Renken 421

- Renken 421 and Zhang 871
- Kamieniecki 879 and Doris 197
- Maycock 671 and Zhang 871
- Maycock 671 and Kidambi 557
- Coyne 311 and Petrovic 916
- Coyne 311, Petrovic 916, and Zhang 871
- Kamieniecki 879 and Caporizzo 992
- Renken 421 and Zhang 871
- Renken 421 and Kidambi 557
- Renken 421 and Coyne 311
- Renken 421 and Doris 197
- Renken 421 and Kamieniecki 879
- Renken 421 and Huffman 708
- Renken 421 and Reddy 068
- Renken 421, Coyne 311, and Zhang 871
- Renken 421, Coyne 311, and Kidambi 557
- Renken 421, Coyne 311, and Huffman 708
- Renken 421, Coyne 311, and Gomez 594
- Renken 421, Coyne 311, and Reddy 068
- Renken 421, Doris 197, and Zhang 871
- Renken 421, Doris 197, and Kidambi 557
- Renken 421, Doris 197, and Kamieniecki 879
- Renken 421, Doris 197, and Huffman 708
- Renken 421, Doris 197, and Reddy 068
- Caporizzo 992 and Zhang 871
- Caporizzo 992 and Kidambi 557
- Caporizzo 992 and Doris 197
- Caporizzo 992 and Kamieniecki 879

- Caporizzo 992 and Huffman 708
- Caporizzo 992 and Reddy 068
- Caporizzo 992, Coyne 311, and Zhang 871
- Caporizzo 992, Coyne 311, and Kidambi 557
- Caporizzo 992, Coyne 311, and Kamieniecki 879
- Caporizzo 992, Coyne 311, and Huffman 708
- Caporizzo 992, Coyne 311, and Reddy 068
- Caporizzo 992, Doris 197, and Zhang 871
- Caporizzo 992, Doris 197, and Kidambi 557
- Caporizzo 992, Doris 197, and Kamieniecki 879
- Caporizzo 992, Doris 197, and Huffman 708
- Caporizzo 992, Doris 197, and Reddy 068
- Gomez 593 and Zhang 871
- Gomez 593 and Kidambi 557
- Gomez 593 and Coyne 311
- Gomez 593 and Doris 197
- Gomez 593 and Kamieniecki 879
- Gomez 593 and Huffman 708
- Gomez 593 and Reddy 068
- Gomez 593, Coyne 311, and Zhang 871
- Gomez 593, Coyne 311, and Kidambi 557
- Gomez 593, Coyne 311, and Kamieniecki 879
- Gomez 593, Coyne 311, and Huffman 708
- Gomez 593, Coyne 311, and Reddy 068
- Gomez 593, Doris 197, and Zhang 871
- Gomez 593, Doris 197, and Kidambi 557
- Gomez 593, Doris 197, and Kamieniecki 879
- Gomez 593, Doris 197, and Huffman 708

- Gomez 593, Doris 197, and Reddy 068
- Kamieniecki 879 and Doris 197
- Kamieniecki 879 and Coyne 311
- Stadelmeier 542 and Zhang 871
- Stadelmeier 542 and Kidambi 557
- Stadelmeier 542 and Coyne 311

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts the foregoing combinations do not teach element 1[a], the foregoing combinations in further combination with any one of Flask 436 or Renken 421 (to the extent Flask 436 or Renken 421 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[b], the foregoing combinations in further combination with Kamieniecki 879 (to the extent Kamieniecki 879 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[c], the foregoing combinations in further combination with Coyne 311 (to the extent Coyne 311 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[d], the foregoing combinations in further combination with Renken 421 (to the extent Renken 421 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[e], the foregoing combinations in further combination with Renken 421 (to the extent Renken 421 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[f], the foregoing combinations in further combination with Coyne 311 (to the extent Coyne 311 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach

element 1[g], the foregoing combinations in further combination with Coyne 311 (to the extent Coyne 311 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach element 1[h], the foregoing combinations in further combination with Renken 421 or Petrovic 916 (to the extent Renken 421 or Petrovic 916 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 2, the foregoing combinations in further combination with Renken 421 or Petrovic 916 (to the extent Renken 421 or Petrovic 916 is not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 3, the foregoing combinations in further combination with Gomez 594 or Petrovic 916 or Renken 421 or Yun 044 (to the extent Gomez 594 or Petrovic 916 or Renken 421 or Yun 044 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 4, the foregoing combinations in further combination with Gomez 594 or Petrovic 916 or Renken 421 (to the extent Gomez 594 or Petrovic 916 or Renken 421) are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 6, the foregoing combinations in further combination with Petrovic 916 or Renken 421 (to the extent Petrovic 916 or Renken 421 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 8, the foregoing combinations in further combination with Kamieniecki 879 (to the extent Kamieniecki 879 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not teach claim 9, the foregoing combinations in further combination with Renken 421 or Doris 197 (to the extent Renken 421 or Doris 197 are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the '362 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Zhang 871
- Zhang 871 and McNeely 490
- Zhang 871 and Eidson 958
- Zhang 871, Eidson 958, and TI App Report
- Zhang 871 and Carson 406
- Zhang 871, Carson 406, and TI App Report
- Zhang 871 and TI App Report
- Zhang 871 and Favrat 779
- Zhang 871 and Gatta
- Petrovic 659
- Petrovic 659 and McNeely 490
- Petrovic 659 and Favrat 779
- Petrovic 659 and TI App Report
- Pugel 369 and Zhang 871
- Pugel 369, Zhang 871, and TI App Report
- Pugel 369, Zhang 871, and Favrat 779
- Pugel 369, Zhang 871, and McNeely 490
- Pugel 369 and Favrat 779
- Pugel 369, Favrat 779, and TI App Report
- Pugel 369 and TI App Report
- Pugel 369 and Petrovic 659
- Pugel 369, Petrovic 659, and TI App Report
- Pugel 369 and Hess 777
- Pugel 369, Hess 777, and TI App Report
- Ben-Hamo 432 and Favrat 779
- Shyshkin 175 and Favrat 779

- Shyshkin 175 and McNeely 490
- Shyshkin 175 and Zhang 871
- Shyshkin 175, Zhang 871, and Favrat 779
- Shyshkin 175, Zhang 871, and McNeely 490
- Gatta
- Gatta and Zhang 871
- Gatta, Zhang 871, and Favrat 779
- Gatta, Zhang 871, and Amit 679
- Gatta, Zhang 871, and Lee 176
- Gatta, Zhang 871, and McNeely 490
- Gatta, Zhang 871, and DOCSIS 3.0
- Gatta and Ben-Hamo 432
- Gatta, Ben-Hamo 432, and Amit 679
- Gatta, Ben-Hamo 432, and Favrat 779
- Gatta, Ben-Hamo 432, and DOCSIS 3.0
- Gatta, Ben-Hamo 432, and Lee 176
- Gatta, Ben-Hamo 432, and McNeely 490
- Gatta and Pugel 369
- Gatta, Pugel 369, and Favrat 779
- Gatta, Pugel 369, and McNeely 490
- Gatta, Pugel 369, and DOCSIS 3.0
- Gatta, Pugel 369, and BCM3380 System Art
- Gatta, Pugel 369, and Lee 176
- Gatta, Pugel 369, and Amit 679
- Gatta and DOCSIS 3.0
- Gatta, DOCSIS 3.0 and Favrat 779
- Gatta, DOCSIS 3.0 and McNeely 490
- Gatta and BCM3380 System Art
- Gatta, BCM3380 System Art, and Favrat 779
- Gatta, BCM3380 System Art, and McNeely 490

- Gatta, BCM3380 System Art, and DOCSIS 3.0
- Gatta and Lee 176
- Gatta, Lee 176, and Favrat 779
- Gatta, Lee 176, and McNeely 490
- Gatta and Amit 679
- Gatta, Amit 679, and Favrat 779
- Gatta, Amit 679, and McNeely 490
- Dauphinee 901 and Favrat 779
- Dauphinee 901 and McNeely 490
- Dauphinee 901 and Gatta
- Dauphinee 901, Gatta, and Favrat 779
- Dauphinee 901, Gatta, and McNeely 490
- McNeely 490 and Favrat 779
- Jensen 217 and Zhang 871
- Zhang 871 and Jensen 217
- Petrovic 659 and Copeland 031
- Tsurumi 051 and Petrovic 659
- Tsurumi 051 and Buda 539
- Tsurumi 051 and Ben-Hamo 432
- McNeely 490 and Pugel 369
- Pugel 369 and Gomez 274
- Ben-Hamo 432 and McNeely 490
- SB6120 System Art and Jensen 217
- Shen 688
- Shen 688 and McNeely 490
- Shen 688 and Eidson 958
- Shen 688, Eidson 958, and TI App. Report
- Shen 688 and Carson 406

- Shen 688, Carson 406, and TI App. Report
- Shen 688 and TI App Report
- Shen 688 and Favrat 779
- Shen 688 and Gatta

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts that the foregoing combination does not disclose element 11[a], the foregoing combinations in further combination with any of DOCSIS 3.0 or Amit 679 or Lee 176 or McNeely 489 (to the extent DOCSIS 3.0 or Amit 679 or Lee 176 or McNeely 489 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose element 11[b], the foregoing combinations in further combination with any of Gomez 274 or Copeland 031 or McNaught-Davis or Shen 688 (to the extent Gomez 274 or Copeland 031 or McNaught-Davis or Shen 688 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose element 11[d], the foregoing combinations in further combination with any of Petrovic 659 or McNeely 489 or Shen 688 (to the extent Petrovic 659 or McNeely 489 or Shen 688 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose element 11[e], the foregoing combinations in further combination with any of Jensen 217 or Eidson 958 or Carson 406 or McNeely 489 or Shen 688 (to the extent Jensen 217 or Eidson 958 or Carson 406 or McNeely 489 or Shen 688 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose claim 12, the foregoing combinations in further combination with any of Favrat 779 or TI App Report or McNeely 489 or Shen 688 (to the extent Favrat 779 or TI App Report or McNeely 489 or Shen 688 are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the '206 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Zhang 871 and Barton 195
- Zhang 871, Barton 195, and Yap 475
- Zhang 871, Barton 195, and Bradley 199
- Zhang 871 and Yap 475
- Zhang 871 and Petrovic 659
- Zhang 871, Petrovic 659, and McNeely 490
- Zhang 871, Petrovic 659, and Kang 409
- Zhang 871, Petrovic 659, and Pugel 369
- Zhang 871 and Bradley 199
- Zhang 871 and TI App. Report
- Zhang 871, TI App Report, and Barton 195
- Zhang 871 and Shyshkin 175
- Zhang 871 and Tsurumi 051
- Zhang 871, Tsurumi 051, and McNeely 490
- Zhang 871, Tsurumi 051, and Kang 409
- Zhang 871, Tsurumi 051, and Pugel 369
- Zhang 871, Tsurumi 051, and Favrat 779
- Zhang 871 and Shyshkin 175,
- Zhang 871, Shyshkin 175, and McNeely 490
- Zhang 871, Shyshkin 175, and Kang 409
- Zhang 871, Shyshkin 175, and Pugel 369
- Zhang 871 and Hess 777
- Zhang 871, Hess 777, and McNeely 490
- Zhang 871, Hess 777, and Kang 409
- Zhang 871, Hess 777, and Pugel 369
- Zhang 871 and Wahab 638

- Zhang 871, Wahab 638, and McNeely 490
- Zhang 871, Wahab 638, and Kang 409
- Zhang 871, Wahab 638, and Pugel 369
- Zhang 871 and McNeely 490
- Zhang 871, McNeely 490 and Favrat 779
- Zhang 871 and Favrat 779
- McNeely 490 and Petrovic 659
- McNeely 490 and Shyshkin 175
- McNeely 490 and Tsurumi 051
- McNeely 490 and Hess 777
- McNeely 490 and Wahab 638
- McNeely 490 and Favrat 779
- McNeely 490, Petrovic 659, and Kang 409
- McNeely 490, Petrovic 659, and Pugel 369
- McNeely 490, Shyshkin 175, and Kang 409
- McNeely 490, Shyshkin 175, and Pugel 369
- McNeely 490, Tsurumi 051, and Kang 409
- McNeely 490, Tsurumi 051, and Pugel 369
- McNeely 490, Hess 777, and Kang 409
- McNeely 490, Hess 777, and Pugel 369
- McNeely 490, Wahab 638 and Kang 409
- McNeely 490, Wahab 638 and Pugel 369
- Ben-Hamo 432 and Tsurumi 051
- Ben-Hamo 432 and Hess 777
- Ben-Hamo 432 and Wahab 638
- Ben-Hamo 432 and McNeely 490
- Ben-Hamo 432 and Favrat 779
- Ben-Hamo 432, McNeely 490, and Favrat 779

- Ben-Hamo 432, Petrovic 659, and McNeely 490
- Ben-Hamo 432, Petrovic 659, and Kang 409
- Ben-Hamo 432, Petrovic 659, and Pugel 369
- Ben-Hamo 432, Shyshkin 175, and McNeely 490
- Ben-Hamo 432, Shyshkin 175, and Kang 409
- Ben-Hamo 432, Shyshkin 175, and Pugel 369
- Ben-Hamo 432, Tsurumi 051, and McNeely 490
- Ben-Hamo 432, Tsurumi 051, and Kang 409
- Ben-Hamo 432, Tsurumi 051, and Pugel 369
- Ben-Hamo 432, Hess 777, and McNeely 490
- Ben-Hamo 432, Hess 777, and Kang 409
- Ben-Hamo 432, Hess 777, and Pugel 369
- Ben-Hamo 432, Wahab 638, and McNeely 490
- Ben-Hamo 432, Wahab 638, and Kang 409
- Ben-Hamo 432, Wahab 638, and Pugel 369
- Gatta and DOCSIS 3.0
- Gatta and BCM3380
- Gatta and Amit 679
- Gatta and Lee 176
- Gatta, DOCSIS 3.0, and Amit 679
- Gatta, DOCSIS 3.0, and Lee 176
- Gatta, DOCSIS 3.0, and Zhang 871
- Gatta, DOCSIS 3.0, and McNeely 490
- Gatta, DOCSIS 3.0, and Pugel 369
- Gatta, DOCSIS 3.0, and BCM3380
- Gatta, BCM3380, and Amit 679
- Gatta, BCM3380, and Lee 176
- Gatta, BCM3380, and Zhang 871

- Gatta, BCM3380, and McNeely 490
- Gatta, BCM3380, and Pugel 369
- Gatta and Pugel 369
- Gatta and Zhang 871
- Gatta and McNeely 490
- Gatta and Ben-Hamo 432
- Gatta, Pugel 369, and Petrovic 659
- Gatta, Zhang 871, and Petrovic 659
- Gatta, McNeely 490, and Petrovic 659
- Gatta, Ben-Hamo 432, and Petrovic 659
- Gatta, Pugel 369, and Shyshkin 175
- Gatta, Zhang 871, and Shyshkin 175
- Gatta, McNeely 490, and Shyshkin 175
- Gatta, Ben-Hamo 432, and Shyshkin 175
- Gatta, Pugel 369, and Tsurumi 051
- Gatta, Zhang 871, and Tsurumi 051
- Gatta, McNeely 490, and Tsurumi 051
- Gatta, Ben-Hamo 432, and Tsurumi 051
- Gatta, Pugel 369, and Hess 777
- Gatta, Zhang 871, and Hess 777
- Gatta, McNeely 490, and Hess 777
- Gatta, Ben-Hamo 432, and Hess 777
- Gatta, Pugel 369, and Wahab 638
- Gatta, Zhang 871, and Wahab 638
- Gatta, McNeely 490, and Wahab 638
- Gatta, Ben-Hamo 432, and Wahab 638
- Gatta, Pugel 369, and Kang 409
- Gatta, Zhang 871, and Kang 409

- Gatta, McNeely 490, and Kang 409
- Gatta, Ben-Hamo 432, and Kang 409
- Gatta, Pugel 369, and Favrat 779
- Gatta, Zhang 871, and Favrat 779
- Gatta, McNeely 490, and Favrat 779
- Gatta, Ben-Hamo 432, and Favrat 779
- Petrovic 659 and Petruzzelli 587
- Petrovic 659, Petruzzelli 587, and TI App. Report
- Petrovic 659, Petruzzelli 587, TI App. Report, and Barton 195
- Petrovic 659 and Olson 778
- Petrovic 659, Olson 778, and TI App. Report
- Petrovic 659 and Pugel 369
- Petrovic 659, Pugel 369, and TI App. Report
- Petrovic 659, Pugel 369, TI App. Report, and Barton 195
- Petrovic 659, Olson 778
- Petrovic 659, Olson 778, and Barton 195
- Petrovic 659, Olson 778, Barton 195, and Bradley 199
- Petrovic 659, Olson 778, Barton 195, and Yap 475
- Petrovic 659, Olson 778, TI App. Report, and Barton 195
- Petrovic 659, Petruzzelli 587
- Petrovic 659, Petruzzelli 587, and Barton 195
- Petrovic 659, Petruzzelli 587, Barton 195, and Bradley 199
- Petrovic 659, Petruzzelli 587, Barton 195, and Yap 475
- Petrovic 659 and Pugel 369
- Petrovic 659, Pugel 369, and Barton 195
- Petrovic 659, Pugel 369, Barton 195, and Bradley 199
- Petrovic 659, Pugel 369, Barton 195, and Yap 475
- Pugel 369 and Barton 195

- Pugel 369, Barton 195, and Bradley 199
- Pugel 369, Barton 195, and Jensen 217
- Pugel 369, Barton 195, and Petrovic 659
- Pugel 369, Barton 195, and TI App Report
- Pugel 369, Barton 195, and Yap 475
- Pugel 369, Barton 195, and Zhang 871
- Pugel 369 and Jensen 217
- Pugel 369, Jensen 217, TI App. Report
- Pugel 369, Jensen 217, TI App. Report, and Barton 195
- Pugel 369, Jensen 217, TI App. Report, and Bradley 199
- Pugel 369, Jensen 217, TI App. Report, and Yap 475
- Pugel 369 and Petrovic 659
- Pugel 369, Petrovic 659, and TI App. Report
- Pugel 369, Petrovic 659, TI App. Report, and Barton 195
- Pugel 369, Petrovic 659, TI App. Report, and Bradley 199
- Pugel 369, Petrovic 659, TI App. Report, and Yap 475
- Pugel 369, Petrovic 659, and McNeely 490
- Pugel 369, Petrovic 659, and Kang 409
- Pugel 369 and Zhang 871
- Pugel 369, Zhang 871, TI App. Report
- Pugel 369, Zhang 871, TI App. Report, and Barton 195
- Pugel 369, Zhang 871, TI App. Report, and Bradley 199
- Pugel 369, Zhang 871, TI App. Report, and Yap 475
- Pugel 369 and Shyshkin 175
- Pugel 369 and Tsurumi 051
- Pugel 369, Tsurumi 051, and McNeely 490
- Pugel 369, Tsurumi 051, and Kang 409
- Pugel 369 and Hess 777

- Pugel 369, Hess 777, and McNeely 490
- Pugel 369, Hess 777, and Kang 409
- Pugel 369 and Wahab 638
- Pugel 369, Wahab 638, and McNeely 490
- Pugel 369, Wahab 638, and Kang 409
- Pugel 369 and McNeely 490
- Pugel 369, McNeely 490, and Favrat
- Pugel 369 and Favrat 779
- Pugel 369, Shyshkin 175, and McNeely 490
- Pugel 369, Shyshkin 175, and Kang 409
- Tsurumi 051 and Petrovic 659
- Tsurumi 051 and Buda 539
- Tsurumi 051 and Ben-Hamo 432
- SB6120 System Art and Jensen 217
- Shen 688 and Barton 195
- Shen 688 and Yap 475
- Shen 688, Barton 195, and Yap 475
- Shen 688, Barton 195, and Bradley 199
- Shen 688 and Bradley 199
- Shen 688 and TI App. Report
- Shen 688, TI App Report, and Barton 195
- Shen 688 and Shyshkin 175
- Shen 688, Tsurumi 051, and Favrat 779

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts the foregoing combinations do not disclose element 13[a], the foregoing combinations with any of Ben-Hamo 432 or Olson 778 or Petruzzelli 578 (to the extent Ben-Hamo 432 or Olson 778 or Petruzzelli 578 are not

already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose element 13[b], the foregoing combinations with any of DOCSIS 3.0 or Amit 679 or Lee 176 or Shen 688 or Virag 722 (to the extent DOCSIS 3.0 or Amit 679 or Lee 176 or Shen 688 or Virag 722 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose element 13[c], the foregoing combinations with any of McNeely 490 or Petrovic 659 or Tsurumi 051 or Busson 396 or Shen 688 or Virag 722 (to the extent Bradley 199 or Yap 475 or Shen 688 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose element 13[d], the foregoing combinations with any of Favrat 779 or TI App. Report or McNeely 489 or Shen 688 (to the extent Favrat 779 or TI App. Report or McNeely 489 or Shen 688 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose claim 14, the foregoing combinations with any of Bradley 199 or Yap 475 (to the extent Bradley 199 or Yap 475 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose claim 19, the foregoing combinations with any of Jensen 217 or McNeely 489 (to the extent Jensen 217 or McNeely 489 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose claim 21, the foregoing combinations with any of Ben-Hamo 432 or Shen 688 or Virag 722 (to the extent Ben-Hamo 432 or Shen 688 or Virag 722 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose claim 23, the foregoing combinations with any of Kang 409 or Barton 195 (to the extent Kang 409 or Barton 195 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose claim 26, the foregoing combinations with any of Bradley 199 or Yap 475 (to

the extent Bradley 199 or Yap 475 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts the foregoing combinations do not disclose claim 39, the foregoing combinations with any of Bradley 199 or Yap 475 (to the extent Bradley 199 or Yap 475 are not already part of the combination) would have rendered the claim obvious.

The asserted claims of the '866 patent would have been obvious to a person of ordinary skill in the art in view of at least the following combinations:

- Zhang 871
- Zhang 871 and TI App Report
- Zhang 871 and Bradley 199
- Zhang 871 and Yap 475
- Zhang 871 and McNeely 490
- Zhang 871, McNeely 490, and Petrovic 659
- Zhang 871, McNeely 490, and Shyshkin 175
- Zhang 871, McNeely 490, and Tsurumi 051
- Zhang 871, McNeely 490, and Hess 777
- Zhang 871, McNeely 490, and Wahab 638
- Zhang 871, McNeely 490, and Favrat 779
- Zhang 871 and Kang 409
- Zhang 871, Kang 409, and Petrovic 659
- Zhang 871, Kang 409, and Shyshkin 175
- Zhang 871, Kang 409, and Tsurumi 051
- Zhang 871, Kang 409, and Hess 777
- Zhang 871, Kang 409, and Wahab 638
- Zhang 871, Kang 409, and McNeely 490
- Zhang 871, Kang 409, and Favrat 779
- Zhang 871 and Pugel 369
- Zhang 871, Pugel 369, and Petrovic 659

- Zhang 871, Pugel 369, and Shyshkin 175
- Zhang 871, Pugel 369, and Tsurumi 051
- Zhang 871, Pugel 369, and Hess 777
- Zhang 871, Pugel 369, and Wahab 638
- Zhang 871, Pugel 369, and McNeely 490
- Zhang 871, Pugel 369, and Favrat 779
- Zhang 871 and Barton 195
- Zhang 871, Barton 195, and Bradley 199
- Zhang 871, Barton 195, and Yap 475
- McNeely 490 and Kang 409
- McNeely 490 and Pugel 369
- McNeely 490, Kang 409, and Petrovic 659
- McNeely 490, Kang 409, and Shyshkin 175
- McNeely 490, Kang 409, and Tsurumi 051
- McNeely 490, Kang 409, and Hess 777
- McNeely 490, Kang 409, and Wahab 638
- McNeely 490, Kang 409, and Favrat 779
- Petrovic 659 and McNeely 490
- Petrovic 659, McNeely 490, and Petrovic 659
- Petrovic 659, McNeely 490, and Shyshkin 175
- Petrovic 659, McNeely 490, and Tsurumi 051
- Petrovic 659, McNeely 490, and Hess 777
- Petrovic 659, McNeely 490, and Wahab 638
- Petrovic 659, McNeely 490, and Favrat 779
- Petrovic 659 and Kang 409
- Petrovic 659, Kang 409, and Petrovic 659
- Petrovic 659, Kang 409, and Shyshkin 175
- Petrovic 659, Kang 409, and Tsurumi 051

- Petrovic 659, Kang 409, and Hess 777
- Petrovic 659, Kang 409, and Wahab 638
- Petrovic 659, Kang 409, and McNeely 490
- Petrovic 659, Kang 409, and Favrat 779
- Petrovic 659 and Petruzzelli 587
- Petrovic 659, Petruzzelli 587, and Bradley 199
- Petrovic 659, Petruzzelli 587, and Zhang 871
- Petrovic 659, Petruzzelli 587, and Barton 195
- Petrovic 659, Petruzzelli 587, Barton 195, TI App Report
- Petrovic 659, Petruzzelli 587, Barton 195 and Bradley 199
- Petrovic 659, Petruzzelli 587, Barton 195, and Yap 475
- Petrovic 659, Petruzzelli 587, Barton 195, and Zhang 871
- Petrovic 659 and Pugel 369
- Petrovic 659, Pugel 369, and Bradley 199
- Petrovic 659, Pugel 369, and Barton 195
- Petrovic 659, Pugel 369, Barton 195, and TI App Report
- Petrovic 659, Pugel 369, Barton 195, and Bradley 199
- Petrovic 659, Pugel 369, Barton 195, and Yap 475
- Petrovic 659, Pugel 369, and Shyshkin 175
- Petrovic 659, Pugel 369, and Tsurumi 051
- Petrovic 659, Pugel 369, and Hess 777
- Petrovic 659, Pugel 369, and Wahab 638
- Petrovic 659, Pugel 369, and McNeely 490
- Petrovic 659, Pugel 369, and Favrat 779
- Petrovic 659 and Olson 778
- Petrovic 659, Olson 778, and Zhang 871
- Petrovic 659, Olson 778, and Bradley 199
- Petrovic 659, Olson 778, and Barton 195

- Petrovic 659, Olson 778, Barton 195, and TI App Report
- Petrovic 659, Olson 778, Barton 195, and Zhang 871
- Petrovic 659, Olson 778, Barton 195, and Bradley 199
- Petrovic 659, Olson 778, Barton 195, and Yap 475
- Pugel 369
- Pugel 369 and TI App Report
- Pugel 369 and McNeely 490
- Pugel 369, McNeely 490, and Petrovic 659
- Pugel 369, McNeely 490, and Shyshkin 175
- Pugel 369, McNeely 490, and Tsurumi 051
- Pugel 369, McNeely 490, and Hess 777
- Pugel 369, McNeely 490, and Wahab 638
- Pugel 369, McNeely 490, and Favrat 779
- Pugel 369 and Kang 409
- Pugel 369, Kang 409, and Petrovic 659
- Pugel 369, Kang 409, and Shyshkin 175
- Pugel 369, Kang 409, and Tsurumi 051
- Pugel 369, Kang 409, and Hess 777
- Pugel 369, Kang 409, and Wahab 638
- Pugel 369, Kang 409, and McNeely 490
- Pugel 369, Kang 409, and Favrat 779
- Pugel 369 and Zhang 871
- Pugel 369, Zhang 871, and TI App Report
- Pugel 369, Zhang 871, and Bradley 199
- Pugel 369, Zhang 871, and Yap 475
- Pugel 369 and Petrovic 659
- Pugel 369, Petrovic 659, and TI App Report
- Pugel 369, Petrovic 659, and Yap 475

- Pugel 369, Petrovic 659, and Bradley 199
- Pugel 369 and Jensen 217
- Pugel 369, Jensen 217, and TI App Report
- Pugel 369, Jensen 217, and Bradley 199
- Pugel 369, Jensen 217, and Yap 475
- Pugel 369 and Barton 195
- Pugel 369, Barton 195, and TI App Report
- Pugel 369, Barton 195, and Zhang 871
- Pugel 369, Barton 195, and Petrovic 659
- Pugel 369, Barton 195, and Jensen 217
- Pugel 369, Barton 195, Zhang 871, and Bradley 199
- Pugel 369, Barton 195, Petrovic 659, and Bradley 199
- Pugel 369, Barton 195, Jensen 217, and Bradley 199
- Pugel 369, Barton 195, Zhang 871, and Yap 475
- Pugel 369, Barton 195, Petrovic 659, and Yap 475
- Pugel 369, Barton 195, Jensen 217, and Yap 475
- Pugel 369, Barton 195, Zhang 871, and TI App Report
- Pugel 369, Barton 195, Petrovic 659, and TI App Report
- Pugel 369, Barton 195, Jensen 217, and TI App Report
- Pugel 369, Barton 195, and Bradley 199
- Pugel 369, Barton 195, and Yap 475
- Pugel 369 and Bradley 199
- Pugel 369 and Yap 475
- Tsurumi 051 and Petrovic 659
- Tsurumi 051 and Buda 539
- Tsurumi 051 and Ben-Hamo 432
- Ben-Hamo 432 and McNeely 490
- Ben-Hamo 432 and Kang 409

- Ben-Hamo 432 and Pugel 369
- Ben-Hamo 432, McNeely 490, and Petrovic 659
- Ben-Hamo 432, McNeely 490, and Shyshkin 175
- Ben-Hamo 432, McNeely 490, and Tsurumi 051
- Ben-Hamo 432, McNeely 490, and Hess 777
- Ben-Hamo 432, McNeely 490, and Wahab 638
- Ben-Hamo 432, McNeely 490, and Favrat 779
- Ben-Hamo 432, Kang 409, and Petrovic 659
- Ben-Hamo 432, Kang 409, and Shyshkin 175
- Ben-Hamo 432, Kang 409, and Tsurumi 051
- Ben-Hamo 432, Kang 409, and Hess 777
- Ben-Hamo 432, Kang 409, and Wahab 638
- Ben-Hamo 432, Kang 409, and McNeely 490
- Ben-Hamo 432, Kang 409, and Favrat 779
- Ben-Hamo 432, Pugel 369, and Petrovic 659
- Ben-Hamo 432, Pugel 369, and Shyshkin 175
- Ben-Hamo 432, Pugel 369, and Tsurumi 051
- Ben-Hamo 432, Pugel 369, and Hess 777
- Ben-Hamo 432, Pugel 369, and Wahab 638
- Ben-Hamo 432, Pugel 369, and McNeely 490
- Ben-Hamo 432, Pugel 369, and Favrat 779
- Gatta and DOCSIS 3.0
- Gatta and BCM3380
- Gatta and Amit 679
- Gatta and Lee 176
- Gatta and STV0498 Product Brief
- Gatta, DOCSIS 3.0, and Amit 679
- Gatta, DOCSIS 3.0, and Lee 176

- Gatta, DOCSIS 3.0, and STV0498 Product Brief
- Gatta, DOCSIS 3.0, and BCM3380
- Gatta, DOCSIS 3.0, and Zhang 871
- Gatta, DOCSIS 3.0, and McNeely 490
- Gatta, DOCSIS 3.0, and Pugel 369
- Gatta, BCM3380, and Amit 679
- Gatta, BCM3380, and Lee 176
- Gatta, DOCSIS 3.0, and STV0498 Product Brief
- Gatta, BCM3380, and Zhang 871
- Gatta, BCM3380, and McNeely 490
- Gatta, BCM3380, and Pugel 369
- Gatta and Pugel 369
- Gatta and Zhang 871
- Gatta and McNeely 490
- Gatta and Ben-Hamo 432
- Gatta, Pugel 369, and Petrovic 659
- Gatta, Zhang 871, and Petrovic 659
- Gatta, McNeely 490, and Petrovic 659
- Gatta, Ben-Hamo 432, and Petrovic 659
- Gatta, Pugel 369, and Shyshkin 175
- Gatta, Zhang 871, and Shyshkin 175
- Gatta, McNeely 490, and Shyshkin 175
- Gatta, Ben-Hamo 432, and Shyshkin 175
- Gatta, Pugel 369, and Tsurumi 051
- Gatta, Zhang 871, and Tsurumi 051
- Gatta, McNeely 490, and Tsurumi 051
- Gatta, Ben-Hamo 432, and Tsurumi 051
- Gatta, Pugel 369, and Hess 777

- Gatta, Zhang 871, and Hess 777
- Gatta, McNeely 490, and Hess 777
- Gatta, Ben-Hamo 432, and Hess 777
- Gatta, Pugel 369, and Wahab 638
- Gatta, Zhang 871, and Wahab 638
- Gatta, McNeely 490, and Wahab 638
- Gatta, Ben-Hamo 432, and Wahab 638
- Gatta, Pugel 369, and Kang 409
- Gatta, Zhang 871, and Kang 409
- Gatta, McNeely 490, and Kang 409
- Gatta, Ben-Hamo 432, and Kang 409
- Gatta, Pugel 369, and Favrat 779
- Gatta, Zhang 871, and Favrat 779
- Gatta, McNeely 490, and Favrat 779
- Gatta, Ben-Hamo 432, and Favrat 779
- SB6120 System Art and Jensen 217
- Shen 688
- Shen 688 and TI App. Report
- Shen 688 and Bradley 199
- Shen 688 and Yap 475
- Shen 688 and Barton 195
- Shen 688, Barton 195, and Bradley 199
- Shen 688, Barton 195, and Yap 475

or any previously mentioned combination in further view of any one other primary reference and/or the knowledge of a POSITA at the time of the alleged invention. To the extent that Entropic asserts that the foregoing combination does not disclose element 27[b], the foregoing combinations in further combination with any of DOCSIS 3.0 or Ben-Hamo 432 or Amit 679 or Lee 176 or STV0498 Product Brief or Kang 409 or

Barton 195 (to the extent DOCSIS 3.0 or Ben-Hamo 432 or Amit 679 or Lee 176 or STV0498 Product Brief or Kang 409 or Barton 195 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose claim 28, the foregoing combinations in further combination with any of Bradley 199 or Yap 475 or Shen 688 or Virag 722 (to the extent Bradley 199 or Yap 475 or Shen 688 or Virag 722 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose element 33[a], the foregoing combinations in further combination with any of Buda 539 or Eidson 958 or Carson 406 (to the extent Buda 539 or Eidson 958 or Carson 406 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose element 33[b], the foregoing combinations in further combination with any of McNeely 489 or Buda 539 or Eidson 958 or Carson 406 or Shen 688 or Virag 722 (to the extent McNeely 489 or Buda 539 or Eidson 958 or Carson 406 or Shen 688 or Virag 722 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose claim 36, the foregoing combinations in further combination with any of Favrat 779 or TI App Report or McNeely 489 (to the extent Favrat 779 or TI App Report or McNeely 489 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose claim 42, the foregoing combinations in further combination with any of Bradley 199 or Yap 475 or Shen 688 (to the extent Bradley 199 or Yap 475 or Shen 688 are not already part of the combination) would have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose element 41[b], the foregoing combinations in further combination with any of McNeely 490 or Petrovic 659 or Tsurumi 051 or Busson 396 or Shen 688 or Virag 722 (to the extent McNeely 490 or Petrovic 659 or Tsurumi 051 or Busson 396 or Shen 688 or Virag 722 are not already part of the combination) would

have rendered the claim obvious. To the extent that Entropic asserts that the foregoing combination does not disclose claim 42, the foregoing combinations in further combination with any of Bradley 199 or Yap 475 or Shen 688 (to the extent Bradley 199 or Yap 475 or Shen 688 are not already part of the combination) would have rendered the claim obvious.

C. Charts Identifying Where Specifically in Each Alleged Item of Prior Art Each Asserted Claim Is Found

Defendants provide hereby charts identifying where specifically in each alleged item of prior art each limitation of each asserted claim is found, the identity of the structure(s), act(s), or material(s) in each item of prior art that performs the claimed function is attached in the Accompanying Exhibits. Defendants contend that the citations included in the claim charts for the independent claims also apply to their associated dependent claims. While relevant portions of the prior art references cited in the charts are exemplary, Defendants reserve the right to rely on all portions of the cited references, including other documents or testimony that may contain additional support for claim limitations. Further, Defendants reserve the right to rely on fact or expert testimony to provide context or aid in understanding the cited portions of the references. Defendants also reserve the right to rely on inventor admissions concerning the scope of the prior art relevant to the Asserted Patents or patents relating to the Asserted Patents.

D. Additional Grounds for Invalidity

1. Grounds of Invalidity Based on 35 U.S.C. § 101

Defendants contend that the asserted claims of the Asserted Patents are not directed toward patent eligible subject matter and reserves the right to challenge the validity of the asserted claims under 35 U.S.C. § 101 at the appropriate time.

The Supreme Court has set forth a two-step framework for assessing patent eligibility. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 218 (2014). At step one, the court determines "whether the claims at issue are directed to" a "patent-ineligible

concept[],” such as “laws of nature, natural phenomena, [or] abstract ideas.” *Id*. If the claims are directed to one of those ineligible concepts, step two asks whether the claims contain an “inventive concept,” or “an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.” Id. at 217-18 (quoting *Mayo Collaborative Servs. v. Prometheus Labs.*, Inc., 566 U.S. 66, 73 (2012)) (internal quotation marks omitted).

At Alice step one, the Asserted Claims are nothing more than “abstract” concepts, such as, *e.g.*, separation of data processing components (’775 patent), setting parameters for a probe/query (’690 patent), analyzing signals and reporting (’008 and ’826 patents), manipulating data in one domain (digital) as opposed to another (analog) (’362, ’206, and ’866 patents), and grouping devices by a common metric and accounting for the worst-case in the group (’682 patent).

At Step Two, none of the Asserted Claims add any element or combination of elements beyond “well-known, routine, conventional activities previously known to the industry.” *Alice*, 573 U.S. at 225 (quotation omitted). Rather, the claims merely recite ubiquitous, and well-known, computer technology, such as an analog-to-digital converter, data processor, serial interface, demodulator, mixer, cable modem, node, data networking engine, DOCSIS controller, DOCSIS MAC processor, data bus, data networking engine, cable modem engine, probe, etc. that are generically and functionally claimed. Indeed, the ’775 patent admits that “cable modem engine 110 [and] data networking engine 120” are described in terms of their “functional sub-components.” ’775 patent at 2:50-54.

As another example, the ’690 Patent admits that, in connection with providing a background for conventional systems, “probes are sent between nodes of the network in order to allow a receiving node on the network to determine some of the characteristics of the channel between the receiving node and the transmitting node.” ’690 patent at 1:49-53. As yet another example, the ’362 patent admits sending a serial

or parallel digital data stream to a demodulator "using a serial or parallel data interface according to commonly known methods." '362 patent at 6:55-58. The '362 patent also admits that, in the context of using N complex mixers for generating digital representations of analog filtered signals, "[i]t is understood that the number N can be any integer value." *Id*. at 5:35-36. Further, the '362 patent admits "wideband tuners" were also well-known. *See generally* '362 patent, 1:46-2:23. The '526 provisional (to which the '362 patent claims priority) admits that "convert[ing] the signal to the digital domain using the wide band ADC converters ADCI and ADC2" was "conventional." '526 provisional at 4, Fig. 1. As a further example, the '008 and '826 patents describe the purported invention as being realized using "typical implementations." "[T]he present invention may be realized in hardware, software, or a combination of hardware and software." '008 patent at 6:45-58. "A typical combination of hardware and software may be a general-purpose computing system … Another typical implementation may comprise an application specific integrated circuit or chip.'008 patent at 6:45-58. Also, the '682 patent likewise describes the purported invention as being realized using "typical implementations." '682 patent at 7:31-44.

Claims that require nothing more than conventional technologies, or simply apply abstract ideas using those conventional technologies, fail the second step of the Alice test. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2016). Further, claim elements described in "purely functional terms" do not provide an inventive concept because they are "not a specific improvement to the way computers operate." *Univ. of Fla. Research Found., Inc. v. Gen. Elec. Co.*, 916 F.3d 1363, 1368 (Fed. Cir. 2019) (internal quotation marks omitted).

The Asserted Claims only recite generic off-the-shelf hardware to accomplish these abstract concepts, and therefore, none of the claimed limitations transform the nature of the claims into something significantly more than a patent upon the ineligible concepts themselves. *Alice*, 573 U.S. at 217–18.

2. Grounds for Invalidity Based on 35 U.S.C. § 112

Defendants hereby identify grounds of invalidity based on lack of written description under 35 U.S.C. § 112(a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112(b); and indefiniteness under 35 U.S.C. § 112(f). In those instances in which Defendants assert that an Asserted Claim is invalid under 35 U.S.C. § 112, Defendants have applied the prior art in accordance with its assumption that Plaintiff contends such Asserted Claim (1) has sufficient supporting written description, (2) is enabled, (3) is not indefinite, and (4) sets forth what the inventors regarded as the invention. These Preliminary Invalidity Contentions should not be construed as an admission that any Asserted Claim meets the requirements of § 112. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' Preliminary Invalidity Contentions under AIA 35 U.S.C. § 112 may depend, in part, on the alleged scope of the Asserted Claims in the intrinsic record, Entropic's Complaint, and/or Entropic's Infringement Contentions. Consequently, Defendants only identify the issues under AIA 35 U.S.C. § 112 of which it is presently aware.

(a) The Asserted Claims Are Invalid under 35 U.S.C. § 112 for Lack of Written Description

The Asserted Patents do not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the Asserted Claims at the time the Asserted Patents were filed. *Ariad Pharms., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the

filing date." *Id*. One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

(i) The '775 Patent

Claim Terms	**Claim Nos.**[25]
"a first circuit that includes at least one processor"	18
"a second circuit that includes at least one processor"	18
"the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine"	18
"the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput"	18
"wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine"	18

[25] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

"a data bus that connects the data networking engine to the cable modem engine"	18
"wherein all DOCSIS functions are localized in the cable modem engine"	19

- "a first circuit that includes at least one processor" (claim 18)
  - The specification and drawings of the '775 Patent do not describe the recited "first circuit" or "circuit." For at least this reason, the written description of the '775 patent fails to demonstrate that the inventors had possession of the claimed subject matter.
- "a second circuit that includes at least one processor" (claim 18)
  - The specification and drawings of the '775 Patent do not describe the recited "second circuit" or "circuit." For at least this reason, the written description of the '775 patent fails to demonstrate that the inventors had possession of the claimed subject matter.
- "the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine" (claim 18)
  - The specification and drawings of the '775 Patent do not describe that the "cable modem engine" is "configured to enable upgrades to its software." For at least this reason, the written description of the '775 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.
- "the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput" (claim 18)

- The specification and drawings of the '775 Patent do not describe that the "DOCSIS MAC processor" is "configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput." For at least this reason, the written description of the '775 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine" (claim 18)

- The specification and drawings of the '775 Patent do not describe that the "cable modem functions" are "completely partitioned" from the "home networking functions performed by the data networking engine." For at least this reason, the written description of the '775 Patent fails to demonstrate that the inventors had possession of the claimed subject matter. Defendants understands that the Court construed the above-mentioned claim limitation to mean "wherein the cable modem engine and the data networking engine are not necessarily physically separate but are functionally separate such that the cable modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine." Claim Construction Memorandum Opinion and Order at 17 (*Entropic Comm., LLC v. Charter Comm., Inc.*, 2:22-CV-00125 (EDTX)).

- "a data bus that connects the data networking engine to the cable modem engine" (claim 18)

- The specification and drawings of the '775 Patent do not describe the recited "data bus." For at least this reason, the written description of the '775 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wherein all DOCSIS functions are localized in the cable modem engine" (claim 19)

- The specification and drawings of the '775 Patent do not describe the recited "DOCSIS functions." For at least this reason, the written description of the written description of the '775 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

(ii) The '690 Patent

Claim Terms	Claim Nos.
"probe request"	1, 7, 8
"a form dictated by the plurality of parameters"	1
"a network problem"	7
"wherein the probe request is generated by a network operator and uploaded to the second node"	8

- "probe request[26]" (claims 1, 7, 8)
  - The recited "probe request" is not described in the specification or drawings of the '690 Patent. For at least this reason, the written description of the '690 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.
- "a form dictated by the plurality of parameters" (claim 1)
  - The specification and drawings of the '690 Patent do not describe "a form dictated by the plurality of parameters." For at least this reason, the written description of the '690 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.
- "a network problem" (claim 7)

[26] In Case No. 2:22-CV-00125-JRG (EDTX), the Court issued a *Markman* order construing this term. *See* Dkt. 265-1.

- The recited "network problem" is not described in the specification or drawings of the '690 Patent. For at least this reason, the written description of the '690 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wherein the probe request is generated by a network operator and uploaded to the second node" (claim 8)
  - The specification and drawings of the '690 Patent do not describe that the probe request is generated by a network operator and uploaded to the second node. For at least this reason, the written description of the '690 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

(iii) The '682 Patent

Claim Terms	Claim Nos.
"generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups"	1
"selecting, by said CMTS, said one or more physical layer communication parameter on a per-OFDM-subcarrier basis"	4
"a probe message"	9
"a metric reporting message"	9

- "generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups" (claim 1)

  - The specification and drawings of the '682 Patent do not describe any specific step for generating a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups. Further, the recited "composite SNR-related metric" is not described in the specification or drawings of the '682 Patent. Further, the recited "worst-case SNR profile of said SNR-related metrics" is not described in the specification or drawings of the '682 Patent.

For at least these reasons, the written description of the '682 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "selecting, by said CMTS, said one or more physical layer communication parameter on a per-OFDM-subcarrier basis" (claim 4)

  - The specification and drawings of the '682 Patent do not describe any specific step for selecting said one or more physical layer communication parameter on a per-OFDM-subcarrier basis. For at least this reason, the written description of the '682 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a probe message" (claim 9)

  - The recited "probe message" is not described in the specification or drawings of the '682 Patent. For at least this reason, the written description of the '682 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a metric reporting message" (claim 9)

  - The recited "metric reporting message" is not described in the specification or drawings of the '682 Patent. For at least this reason, the written description of the '682 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

(iv) The '008 and '826 Patents

Claim Terms	Claim Nos.
"an analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum comprising a plurality of television channels"	'008 patent (claim 1)
"a channelizer operable to : . . . concurrently output said first portion of said digitized signal to said signal monitor and said portion of said digitized signal to said data processor"	'008 patent (claim 1)
"signal monitor"	'008 patent (claim 1)
"concurrently outputting said selected first portion and said selected second portion"	'008 patent (claim 3)
"signal analyzer"	'008 patent (claim 3)
"wherein said one or more characteristics is one of: signal power vs. frequency, phase vs. frequency, signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate"	'008 patent (claim 5)
"controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein	'826 patent (claim 1)

said measured characteristic is different than said network management messages"	
"wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate"	'826 patent (claim 8)

- "an analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum comprising a plurality of television channels" ('008 patent, claim 1)

  - The specification and drawings of the '008 Patent do not describe an "analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum." For at least this reason, the written description of the '008 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a channelizer operable to : . . . concurrently output said first portion of said digitized signal to said signal monitor and said portion of said digitized signal to said data processor" ('008 patent, claim 1)

  - The specification and drawings of the '008 Patent do not describe that a "channelizer" is operable to "concurrently output said first portion of said digitized signal to said signal monitor and said portion of said digitized signal to said data processor." For at least this reason, the written description of the '008 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a signal monitor" ('008 patent, claim 1)

  - The recited "signal monitor" is not described in the specification or drawings of the '008 Patent. For at least this reason, the written description of the '008 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "concurrently outputting said selected first portion and said selected second portion" ('008 patent, claim 3)

  - The specification and drawings of the '008 Patent do not describe a specific step for "concurrently outputting said selected first portion and said selected second portion." For at least this reason, the written description of the '008 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a signal analyzer" ('008 patent, claim 3)

  - The recited "signal analyzer" is not described in the specification or drawings of the '008 Patent. For at least this reason, the written description of the '008 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wherein said one or more characteristics is one of: signal power vs. frequency, phase vs. frequency, signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate" ('008 patent, claim 5)

  - The specification and drawings of the '008 Patent do not describe the characteristics including "peak-to-average ratio," "noise levels" and "bit error rate." For at least this reason, the written description of the '008 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages" ('826 patent, claim 1)

  - The specification and drawings of the '826 Patent do not describe a specific step for controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal. For at least this reason, the written description of the '826 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate" ('826 patent, claim 8)

- The specification and drawings of the '826 Patent do not describe the characteristics including "peak-to-average ratio," "noise levels," "bit error rate," and "symbol error rate." For at least this reason, the written description of the '826 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

(v) The '206, '866, and '362 Patents

Claim Terms	Claim Nos.
"wideband"	'206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41)
"wideband analog-to-digital converter (ADC)"	'206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41)
"digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels"	'206 patent (claim 13, 38)
The step of "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels" prior to the step of "digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs"	'206 patent (claim 13)

"digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal"	'206 patent (claim 25)
"a wideband analog-to-digital converter (ADC) configured to digitize a contiguous band of frequencies in an input signal, wherein the contiguous band of frequencies comprises a plurality of desired channels and a plurality of undesired channels"	'866 patent (claim 27)
"a wideband analog-to-digital converter (ADC) configured to digitize an input signal, wherein the input signal comprises a plurality of desired channels and a plurality of undesired channels"	'866 patent (claim 41)
"wherein the DFE is configured to concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels"	'866 patent (claim 27)
"digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system,	'362 patent (claim 11)

said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels"	
"selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies"	'362 patent (claim 11)
"outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface"	'362 patent (claim 12)
"providing the plurality of digital channel outputs via a serial interface"	'866 patent (claims 13, 34, 47)
"the DFE is operable to provide the plurality of desired channels via a serial interface"	'206 patent (claims 36)
"the plurality of digital down converters is operable to provide each digital channel output via a serial interface"	'206 patent (claims 50)

- "wideband" ('206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41))
  - The specification and drawings of the '206/'866/'362 Patents do not provide written description support for a claimed system that operates on a "wideband"

signal as Entropic appears to interpret that term, and thus fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wideband analog-to-digital converter (ADC)" ('206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41))

  - The specification and drawings of the '206 Patent do not describe a "wideband analog-to-digital converter (ADC)." For at least this reason, the written description of the '206 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels" ('206 patent, claim 13)

  - The specification and drawings of the '206 Patent do not describe a step for digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC). For at least this reason, the written description of the '206 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- The step of "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels" prior to the step of "digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs" ('206 patent, claim 13)

  - The specification and drawings of the '206 Patent do not describe that the step of digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC) occurs prior to digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs. For at least this reason, the written description of the '206 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal" ('206 Patent, claim 25)

  - The specification and drawings of the '206 Patent do not describe a specific step for digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal. For at least this reason, the written description of the '206 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a wideband analog-to-digital converter (ADC) configured to digitize a contiguous band of frequencies in an input signal, wherein the contiguous band of frequencies comprises a plurality of desired channels and a plurality of undesired channels" ('866 Patent, claim 27)

  - The specification and drawings of the '866 Patent do not describe "a wideband analog-to-digital converter (ADC) configured to digitize a contiguous band of frequencies in an input signal, wherein the contiguous band of frequencies comprises a plurality of desired channels and a plurality of undesired channels." Specifically, the '866 Patent specification does not describe digitizing a contiguous band of frequencies comprising a plurality of desired channels and a plurality of undesired channels. For at least this reason, the written description of the '866 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "a wideband analog-to-digital converter (ADC) configured to digitize an input signal, wherein the input signal comprises a plurality of desired channels and a plurality of undesired channels" ('866 Patent, claim 41)

  - The specification and drawings of the '866 Patent do not describe "a wideband analog-to-digital converter (ADC) configured to digitize an input signal, wherein the input signal comprises a plurality of desired channels and a plurality of

undesired channels." Specifically, the '866 Patent specification does not describe digitizing an input signal comprising a plurality of desired channels and a plurality of undesired channels. For at least this reason, the written description of the '866 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.

- "wherein the DFE is configured to concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels" ('866 Patent, claim 27)
    - The specification and drawings of the '866 Patent do not describe that the digital frontend is configured to concurrently select and provide each of the plurality of desired channels without providing any of the undesired channels. For at least this reason, the written description of the '866 Patent fails to demonstrate that the inventors had possession of the claimed subject matter.
- "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels" ('362 Patent, claim 11)
    - The specification and drawings of the '362 Patent do not describe a specific step for a wideband analog-to-digital converter module of said wideband receiver system digitizing said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels. For at least this reason, the written description of the '362 Patent fails to demonstrate that the inventors had possession of the claimed subject matter
- "selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies" '362 patent (claim 11)
    - The specification and drawings of the '362 Patent do not describe how the selection of channels by digital circuitry is performed.

- "outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface" '362 patent, claim 12); "providing the plurality of digital channel outputs via a serial interface" ('866 patent , claims 13, 34, 47); "the DFE is operable to provide the plurality of desired channels via a serial interface" ('206 patent, claims 36); "the plurality of digital down converters is operable to provide each digital channel output via a serial interface" ('206 patent, claims 50)
    - The specification and drawings of the '362, '866, and '260 Patents do not describe how the output of data in serial format is performed.

(b) The Asserted Claims Are Invalid under 35 U.S.C. § 112 for Lack of Enablement

The specifications of the Asserted Patents also do not enable one of ordinary skill in the art make and/or use certain recited elements of the Asserted Claims without undue experimentation. *Alcon Research Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1188 (Fed. Cir. 2014) (quoting *In re Wands*, 858 F.2d 731, 736–37 (Fed. Cir. 1988). To the extent the limitations listed below are definite (under AIA 35 U.S.C. § 112(b)), the applications that became the Asserted Patents fail to sufficiently describe or enable them as required by AIA 35 U.S.C. § 112(a).

(i) The '775 Patent

Claim Terms	**Claim Nos.**[27]
"a first circuit that includes at least one processor"	18
"a second circuit that includes at least one processor"	18
"the cable modem engine	18

[27] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine"	
"the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput"	18
"wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine"	18
"a data bus that connects the data networking engine to the cable modem engine"	18
"wherein all DOCSIS functions are localized in the cable modem engine"	19

- "a first circuit that includes at least one processor" (claim 18)
  - The specification and drawings of the '775 Patent do not describe the recited "first circuit" or "circuit." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "a second circuit that includes at least one processor" (claim 18)
  - The specification and drawings of the '775 Patent do not describe the recited "second circuit" or "circuit." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine" (claim 18)
  - The specification and drawings of the '775 Patent do not describe that the "cable modem engine" is "configured to enable upgrades to its software." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput" (claim 18)
  - The specification and drawings of the '775 Patent do not describe that the "DOCSIS MAC processor" is "configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine" (claim 18)

- The specification and drawings of the '775 Patent do not describe that the "cable modem functions" are "completely partitioned" from the "home networking functions performed by the data networking engine." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation. Defendants understands that the Court construed the above-mentioned claim limitation to mean "wherein the cable modem engine and the data networking engine are not necessarily physically separate but are functionally separate such that the cable modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine." Claim Construction Memorandum Opinion and Order at 17 (*Entropic Comm., LLC v. Charter Comm., Inc.*, 2:22-CV-00125 (EDTX).

- "a data bus that connects the data networking engine to the cable modem engine" (claim 18)
  - The specification and drawings of the '775 Patent do not describe the recited "data bus." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "wherein all DOCSIS functions are localized in the cable modem engine" (claim 19)
  - The specification and drawings of the '775 Patent do not describe the recited "DOCSIS functions." For at least this reason, the written description of the '775 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

(ii) The '690 Patent

Claim Terms	Claim Nos.
"probe request"	1, 7, 8

"a form dictated by the plurality of parameters"	1
"a network problem"	7
"wherein the probe request is generated by a network operator and uploaded to the second node"	8

- "probe request" (claims 1, 7, 8)
    - The recited "probe request" is not described in the specification or drawings of the '690 Patent. For at least this reason, the written description of the '690 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "a form dictated by the plurality of parameters" (claim 1)
    - The specification and drawings of the '690 Patent do not describe a form dictated by the plurality of parameters. For at least this reason, the written description of the '690 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "a network problem" (claim 7)
    - The recited "network problem" is not described in the specification or drawings of the '690 Patent. For at least this reason, the written description of the '690 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "wherein the probe request is generated by a network operator and uploaded to the second node" (claim 8)
    - The specification and drawings of the '690 Patent do not describe that the probe request is generated by a network operator and uploaded to the second node. For at least this reason, the written description of the '690 patent fails to enable a person of

ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

(iii) The '682 Patent

Claim Terms	Claim Nos.
"generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups"	1
"selecting, by said CMTS, said one or more physical layer communication parameter on a per-OFDM-subcarrier basis"	4
"a probe message"	9
"a metric reporting message"	9

- "generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups" (claim 1)

  - The specification and drawings of the '682 Patent do not describe any specific step for generating a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups. Further, the recited "composite SNR-related metric" is not described in the specification or drawings of the '682 Patent. Further, the recited "worst-

case SNR profile of said SNR-related metrics" is not described in the specification or drawings of the '682 Patent. For at least these reasons, the written description of the '682 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "selecting, by said CMTS, said one or more physical layer communication parameter on a per-OFDM-subcarrier basis" (claim 4)
  - The specification and drawings of the '682 Patent do not describe any specific step for selecting said one or more physical layer communication parameter on a per-OFDM-subcarrier basis. For at least this reason, the written description of the '682 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "a probe message" (claim 9)
  - The recited "probe message" is not described in the specification or drawings of the '682 Patent. For at least this reason, the written description of the '682 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "a metric reporting message" (claim 9)
  - The recited "metric reporting message" is not described in the specification or drawings of the '682 Patent. For at least this reason, the written description of the '682 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

(iv) The '008 and '826 Patents

Claim Terms	Claim Nos.
"an analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum	'008 patent (claim 1)

comprising a plurality of television channels"	
"a channelizer operable to : . . . concurrently output said first portion of said digitized signal to said signal monitor and said portion of said digitized signal to said data processor"	'008 patent (claim 1)
"signal monitor"	'008 patent (claim 1)
"concurrently outputting said selected first portion and said selected second portion"	'008 patent (claim 3)
"signal analyzer"	'008 patent (claim 3)
"wherein said one or more characteristics is one of: signal power vs. frequency, phase vs. frequency, signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate"	'008 patent (claim 5)
"controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages"	'826 patent (claim 1)
"wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise	'826 patent (claim 8)

levels, bit error rate, and symbol error rate"	

- "an analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum comprising a plurality of television channels" ('008 patent, claim 1)

  - The specification and drawings of the '008 Patent do not describe an "analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum." Specifically, the '008 Patent does not describe a specific step for digitizing a received signal spanning an entire television spectrum. For at least this reason, the written description of the '008 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "a channelizer operable to : . . . concurrently output said first portion of said digitized signal to said signal monitor and said portion of said digitized signal to said data processor" ('008 patent, claim 1)

  - The specification and drawings of the '008 Patent do not describe that a "channelizer" is operable to "concurrently output said first portion of said digitized signal to said signal monitor and said portion of said digitized signal to said data processor." For at least this reason, the written description of the '008 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "a signal monitor" ('008 patent, claim 1)

  - The recited "signal monitor" is not described in the specification or drawings of the '008 Patent. For at least this reason, the written description of the '008 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "concurrently outputting said selected first portion and said selected second portion" ('008 patent, claim 3)

The specification and drawings of the '008 Patent do not describe a specific step for "concurrently outputting said selected first portion and said selected second portion." For at least this reason, the written description of the '008 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "a signal analyzer" ('008 patent, claim 3)

  - The recited "signal analyzer" is not described in the specification or drawings of the '008 Patent. For at least this reason, the written description of the '008 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "wherein said one or more characteristics is one of: signal power vs. frequency, phase vs. frequency, signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate" ('008 patent, claim 5)

  - The specification and drawings of the '008 Patent do not describe the characteristics including "peak-to-average ratio," "noise levels" and "bit error rate." For at least this reason, the written description of the '008 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages" ('826 patent, claim 1)

  - The specification and drawings of the '826 Patent do not describe a specific step for controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal. For at least this reason, the written description of the '826 patent fails to enable a person of ordinary

skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate" ('826 patent, claim 8)
  - The specification and drawings of the '826 Patent do not describe the characteristics including "peak-to-average ratio," "noise levels," "bit error rate," and "symbol error rate." For at least this reason, the written description of the '826 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

(v) The '206, '866, and '362 Patents

Claim Terms	Claim Nos.
"wideband"	'206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41) 27-28, 33, 36-37, 41-42, 47, 50, and 51
"wideband analog-to-digital converter (ADC)"	'206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41)
"digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels"	'206 patent (claim 13, 38)
The step of "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a	'206 patent (claim 13)

plurality of undesired channels" prior to the step of "digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs"	
"digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal"	'206 patent (claim 25)
"a wideband analog-to-digital converter (ADC) configured to digitize a contiguous band of frequencies in an input signal, wherein the contiguous band of frequencies comprises a plurality of desired channels and a plurality of undesired channels"	'866 patent (claim 27)
"a wideband analog-to-digital converter (ADC) configured to digitize an input signal, wherein the input signal comprises a plurality of desired channels and a plurality of undesired channels"	'866 patent (claim 41)
"wherein the DFE is configured to concurrently select and provide each of the plurality of desired channels	'866 patent (claim 27)

without providing any of the plurality of undesired channels"	
"digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels"	'362 patent (claim 11)
"selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies"	'362 patent (claim 11)
"outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface"	'362 patent (claim 12)
"providing the plurality of digital channel outputs via a serial interface"	'866 patent (claims 13, 34, 47)
"the DFE is operable to provide the plurality of desired channels via a serial interface"	'206 patent (claims 36)
"the plurality of digital down converters is operable to provide each digital channel output via a serial interface"	'206 patent (claims 50)

- "wideband" ('206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41))

  - The specification and drawings of the '206/'866/'362 Patents does not describe how to implement the claimed system on a "wideband" signal as Entropic appears to interpret that term, and thus fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "wideband analog-to-digital converter (ADC)" ('206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41))

  - The specification and drawings of the '206 Patent do not describe how to implement a "wideband analog-to-digital converter (ADC)." For at least this reason, the written description of the '206 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels" ('206 patent, claim 13, 38)

  - The specification and drawings of the '206 Patent do not describe a specific step for digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC). Specifically, the specification and drawings do not describe "digitizing *all* received channels in the input signal," emphasis added. For example, the shared specification of the patents describes that "it is understood" that the number of desired RF channels N located in the non-contiguous portions of the frequency spectrum can be any integer value. *See* '206 patent, 5:53-56. However, the specification and drawings do not describe how the number of desired RF channels can be implemented at any integer value.

For at least these reasons, the written description of the '206 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- The step of "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels" prior to the step of "digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs" ('206 patent, claim 13)
  - The specification and drawings of the '206 Patent do not describe that the step of "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC)" occurs prior to "digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs." For at least this reason, the written description of the '206 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal" ('206 Patent, claim 25)
  - The specification and drawings of the '206 Patent do not describe a specific step for "digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal." Specifically, the '206 Patent specification does not describe digitizing all received channels that exist in the input channel. For example, the shared specification of the patents describes that "it is understood" that the number of desired RF channels N located in the non-contiguous portions of the frequency spectrum can be any integer value. *See* '206 patent,

5:53-56. However, the specification and drawings do not describe how the number of desired RF channels can be implemented at any integer value.

For at least these reasons, the written description of the '206 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "a wideband analog-to-digital converter (ADC) configured to digitize a contiguous band of frequencies in an input signal, wherein the contiguous band of frequencies comprises a plurality of desired channels and a plurality of undesired channels" ('866 Patent, claim 27)
  - The specification and drawings of the '866 Patent do not describe "a wideband analog-to-digital converter (ADC) configured to digitize a contiguous band of frequencies in an input signal, wherein the contiguous band of frequencies comprises a plurality of desired channels and a plurality of undesired channels." Specifically, the '866 Patent specification does not describe digitizing a contiguous band of frequencies comprising a plurality of desired channels and a plurality of undesired channels. For example, the shared specification of the patents describes that "it is understood" that the number of desired RF channels N located in the non-contiguous portions of the frequency spectrum can be any integer value. *See* '866 patent, 5:53-56. However, the specification and drawings do not describe how the number of desired RF channels can be implemented at any integer value.

For at least these reasons, the written description of the '866 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "a wideband analog-to-digital converter (ADC) configured to digitize an input signal, wherein the input signal comprises a plurality of desired channels and a plurality of undesired channels" ('866 Patent, claim 41)
  - The specification and drawings of the '866 Patent do not describe "a wideband analog-to-digital converter (ADC) configured to digitize an input signal,

wherein the input signal comprises a plurality of desired channels and a plurality of undesired channels." Specifically, the '866 Patent specification does not describe digitizing an input signal comprising a plurality of desired channels and a plurality of undesired channels. For example, the shared specification of the patents describes that "it is understood" that the number of desired RF channels N located in the non-contiguous portions of the frequency spectrum can be any integer value. *See* '866 patent, 5:53-56. However, the specification and drawings do not describe how the number of desired RF channels can be implemented at any integer value.

For at least these reasons, the written description of the '866 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

- "wherein the DFE is configured to concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels" ('866 Patent, claim 27)
    - The specification and drawings of the '866 Patent do not describe that the digital frontend is configured to concurrently select and provide each of the plurality of desired channels without providing any of the undesired channels. For at least this reason, the written description of the '866 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.
- "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels" ('362 Patent, claim 11)
    - The specification and drawings of the '362 Patent do not describe a specific step for a wideband analog-to-digital converter module of said wideband receiver system digitizing said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels. For

example, the shared specification of the patents describes that "it is understood" that the number of desired RF channels N located in the non-contiguous portions of the frequency spectrum can be any integer value. *See* '362 patent, 5:33-36. However, the specification and drawings do not describe how the number of desired RF channels can be implemented at any integer value, including said plurality desired television channels and said plurality of undesired television channels.

- "selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies"'362 patent (claim 11)
    - The specification and drawings of the '362 Patent do not describe a specific step for selecting digital channels, or how any circuitry would perform this step.
- "outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface" '362 patent, claim 12); "providing the plurality of digital channel outputs via a serial interface" ('866 patent , claims 13, 34, 47); "the DFE is operable to provide the plurality of desired channels via a serial interface" ('206 patent, claims 36); "the plurality of digital down converters is operable to provide each digital channel output via a serial interface" ('206 patent, claims 50)
    - The specification and drawings of the '362 Patent do not describe how data would be output in serial format, or what device would perform the necessary parallel-to-serial operation involved in modifying multiple parallel data channels to serial output.

For at least these reasons, the written description of the '362 patent fails to enable a person of ordinary skill in the art to make, use, or practice the full scope of the claimed invention without undue experimentation.

(c) The Asserted Claims Are Invalid under 35 U.S.C. § 112(b) for Indefiniteness

Under 35 U.S.C. § 112(b), "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Several of the Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112(b), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention. The following limitations recited in the Asserted Claims are indefinite in whole, in part or in combination:

(i) The '775 Patent

Claim Terms	Claim Nos.
"a data networking engine"	18
"a cable modem engine"	18
"data bus"	18
"DOCSIS MAC processor"	18
"DOCSIS controller"	18
"wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine"	18
"all DOCSIS functions"	19

- "a data networking engine" (claim 18)

- A person of ordinary skill in the art would not understand with reasonable certainty what a "data networking engine" means within the context of the claim language and the intrinsic record.

- "a cable modem engine" (claim 18)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "cable modem engine" means within the context of the claim language and the intrinsic record.
- "data bus" (claim 18)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "data bus" means within the context of the claim language and the intrinsic record.
- "DOCSIS MAC processor" (claim 18)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "DOCSIS MAC processor" means within the context of the claim language and the intrinsic record.
- "DOCSIS controller" (claim 18)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "DOCSIS controller" means within the context of the claim language and the intrinsic record.
- "wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine" (claim 18)
  - A person of ordinary skill in the art would not understand with reasonable certainty what the "cable modem functions performed by the cable modem engine" being "completely partitioned from the home networking functions performed by the data networking engine" means within the context of the claim language and the intrinsic record. Defendants understands that the Court construed the above-mentioned claim limitation to mean "wherein the cable modem engine and the data networking

engine are not necessarily physically separate but are functionally separate such that the cable modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine." Claim Construction Memorandum Opinion and Order at 17 (*Entropic Comm., LLC v. Charter Comm., Inc.*, 2:22-CV-00125 (EDTX).

- "all DOCSIS functions" (claim 19)
    - A person of ordinary skill in the art would not understand with reasonable certainty what "all DOCSIS functions" means within the context of the claim language and the intrinsic record.

(ii) The '690 Patent

Claim Terms	Claim Nos.
"node"	1, 8
"probe request"	1, 7, 8
"parameters associated with the generation and transmission of a probe"	1
"content payload"	1
"a form dictated by the plurality of parameters"	1
"a network problem"	7

- "node" (claims 1, 8)
    - The term "node" invokes 35 U.S.C. § 112 ¶ 6 without disclosure of sufficient corresponding structure, thereby rendering the term indefinite.
- "probe request" (claim 1, 7, 8)

- A person of ordinary skill in the art would not understand with reasonable certainty what a "probe request" means within the context of the claim language and the intrinsic record.

- "parameters associated with the generation and transmission of a probe" (claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "parameters associated with the generation and transmission of a probe" means within the context of the claim language and the intrinsic record.
- "content payload" (claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "content payload" means within the context of the claim language and the intrinsic record.
- "a form dictated by the plurality of parameters" (claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "form dictated by the plurality of parameters" means within the context of the claim language and the intrinsic record.
- "a network problem" (claim 7)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "network problem" means within the context of the claim language and the intrinsic record.

(iii) The '682 Patent

Claim Terms	**Claim Nos.**
"signal-to-noise ratio (SNR) related metric"	1
"composite SNR-related metric"	1

"based at least in part on a worst-case SNR profile"	1
"a per-OFDM-subcarrier basis"	4
"a probe message"	9
"instructions for measuring a metric"	9
"a metric reporting message"	9

- "signal-to-noise ratio (SNR) related metric" (claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "probe request" means within the context of the claim language and the intrinsic record.
- "composite SNR-related metric" (claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "composite SNR-related metric" means within the context of the claim language and the intrinsic record.
- "based at least in part on a worst-case SNR profile" (claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "based at least in part on a worst-case SNR profile" means within the context of the claim language and the intrinsic record.
- "a per-OFDM-subcarrier basis" (claim 4)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a per-OFDM-subcarrier basis" means within the context of the claim language and the intrinsic record.
- "a probe message" (claim 9)

- A person of ordinary skill in the art would not understand with reasonable certainty what "a probe message" means within the context of the claim language and the intrinsic record.

- "instructions for measuring a metric" (claim 9)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "instructions for measuring a metric" means within the context of the claim language and the intrinsic record.
- "a metric reporting message" (claim 9)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a metric reporting message" means within the context of the claim language and the intrinsic record.

(iv) The '008 and '826 Patents

Claim Terms	**Claim Nos.**
"an analog-to-digital converter"	'008 Patent (claim 1)
"an entire television spectrum"	'008 Patent (claim 1)
"digitized signal"	'008 Patent (claim 1-3); '826 Patent (claim 1, 9)
"a characteristic of said digitized signal"	'008 Patent (claim 1)
"a data processor"	'008 Patent (claim 1, 3)
"a channelizer"	'008 Patent (claim 1)
"signal monitor"	'008 Patent (claim 1)
"a first portion of said digitized signal"	'008 Patent (claims 1, 3); '826 Patent (claim 1)

"a second portion of said digitized signal"	'008 Patent (claims 1, 3); '826 Patent (claim 1)
"digitizing said received signal from F_{lo} to F_{hi} to generate a digitized signal"	'008 Patent (claim 3);
"concurrently outputting said selected first portion and said selected second portion"	'008 Patent (claim 3);
"signal analyzer"	'008 Patent (claim 3)
"one or more circuits of a receiver"	'008 Patent (claim 3); '826 Patent (claim 1)
"digitizing said received signal to generate a digitized signal"	'826 Patent (claim 1)
"controlling the transmission of network management messages to said headend"	'826 Patent (claim 1)
"a characteristic of said received signal"	'826 Patent (claim 1)
"network management messages"	'826 Patent (claim 1)

- "an analog-to-digital converter" ('008 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "an analog-to-digital converter" means within the context of the claim language and the intrinsic record.
- "an entire television spectrum" ('008 Patent, claim 1)

- A person of ordinary skill in the art would not understand with reasonable certainty what "an entire television spectrum" means within the context of the claim language and the intrinsic record.

- "digitized signal" ('008 Patent, claim 1-3; '826 Patent, claim 1, 9)
  - A person of ordinary skill in the art would not understand with reasonable certainty what a "digitized signal" means within the context of the claim language and the intrinsic record.
- "a characteristic of said digitized signal" ('008 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a characteristic of said digitized signal" means within the context of the claim language and the intrinsic record.
- "a data processor" ('008 Patent, claim 1, 3)
  - The term "data processor" invokes 35 U.S.C. § 112 ¶ 6 without disclosure of sufficient corresponding structure, thereby rendering the term indefinite.
- "a channelizer" ('008 Patent, claim 1)
  - The term "channelizer" invokes 35 U.S.C. § 112 ¶ 6 without disclosure of sufficient corresponding structure, thereby rendering the term indefinite.
- "signal monitor" ('008 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "signal monitor" means within the context of the claim language and the intrinsic record.
- "a first portion of said digitized signal" ('008 Patent, claim 1, 3; '826 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a first portion of said digitized signal" means within the context of the claim language and the intrinsic record.
- "a second portion of said digitized signal" ('008 Patent, claim 1, 3; '826 Patent, claim 1)

- A person of ordinary skill in the art would not understand with reasonable certainty what "a second portion of said digitized signal" means within the context of the claim language and the intrinsic record.

- "digitizing said received signal from F_{lo} to F_{hi} to generate a digitized signal" ('008 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digitizing said received signal from F_{lo} to F_{hi} to generate a digitized signal" means within the context of the claim language and the intrinsic record.
- "concurrently outputting said selected first portion and said selected second portion" ('008 Patent, claim 3)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "concurrently outputting said selected first portion and said selected second portion" means within the context of the claim language and the intrinsic record.
- "signal analyzer" ('008 Patent, claim 3)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "signal analyzer" means within the context of the claim language and the intrinsic record.
- "one or more circuits" ('008 Patent, claim 3; '826 Patent, claim 1)
  - The term "one or more circuits" invokes 35 U.S.C. § 112 ¶ 6 without disclosure of sufficient corresponding structure, thereby rendering the term indefinite.
- "digitizing said received signal to generate a digitized signal" ('826 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digitizing said received signal to generate a digitized signal" means within the context of the claim language and the intrinsic record.
- "controlling the transmission of network management messages to said headend" ('826 Patent, claim 1)

- A person of ordinary skill in the art would not understand with reasonable certainty what "controlling the transmission of network management messages to said headend" means within the context of the claim language and the intrinsic record.

- "a characteristic of said received signal" ('826 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a characteristic of said received signal" means within the context of the claim language and the intrinsic record.
- "network management messages" ('826 Patent, claim 1)
  - A person of ordinary skill in the art would not understand with reasonable certainty what "network management messages" means within the context of the claim language and the intrinsic record.

(v) The '206, '866, and '362 Patents

Claim Terms	**Claim Nos.**
"wideband"	'206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41) 27-28, 33, 36-37, 41-42, 47, 50, and 51
"wideband analog-to-digital converter (ADC)"	'206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41) 27-28, 33, 36-37, 41-42, 47, 50, and 51
"all received channels"	'206 patent (claim 13, 25, 38)
"serial interface"	'206 patent (claim 13, 34, 47); '362 patent (claim 12); '866 patent (claim 36)
"plurality of desired television channels"	'206 patent (claim 13); '362 patent (claim 11); '866 patent (claim 27, 41)
"plurality of undesired television channels"	'206 patent (claim 13); '362 patent (claim 11); '866 patent (claim 27, 41)
"digitizing all received channels in the input signal	'206 patent (claim 13, 38)

via a wideband analog-to-digital converter (ADC)"	
"digitally down converting each desired channel"	'206 patent (claim 13, 38)
"digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC)"	'206 patent (claim 25)
"concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels"	'206 patent (claim 25)
"a contiguous band of frequencies in an input signal"	'866 patent (claim 27)
"concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels"	'866 patent (claim 27)
"a wideband receiver system"	'362 patent (claim 11)
"digital circuitry"	'362 patent (claim 11)
"a digital datastream"	'362 patent (claim 11)
"downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies…"	'362 patent (claim 11)
"digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system,	'362 patent (claim 11)

said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels"	
"selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies"	'362 patent (claim 11)
"outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface"	'362 patent (claim 12)
"providing the plurality of digital channel outputs via a serial interface"	'866 patent (claims 13, 34, 47)
"the DFE is operable to provide the plurality of desired channels via a serial interface"	'206 patent (claims 36)
"the plurality of digital down converters is operable to provide each digital channel output via a serial interface"	'206 patent (claims 50)

- "wideband" ('206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "wideband" means within the context of the claim language and the intrinsic record.

- "wideband analog-to-digital converter (ADC)" ('206 patent (claim 13, 25, 38); '362 patent (claim 11); '866 patent (claim 27, 41))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "wideband analog-to-digital converter (ADC)" means within the context of the claim language and the intrinsic record.
- "all received channels" ('206 patent (claim 13, 25, 38))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "all received channels" means within the context of the claim language and the intrinsic record.
- "serial interface" ('206 patent (claim 13, 34, 47); '362 patent (claim 12); '866 patent (claim 36))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "serial interface" means within the context of the claim language and the intrinsic record.
- "plurality of desired television channels" ('206 patent (claim 13); '362 patent (claim 11); '866 patent (claim 27, 41))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "plurality of desired television channels" means within the context of the claim language and the intrinsic record.
- "plurality of undesired television channels" ('206 patent (claim 13); '362 patent (claim 11); '866 patent (claim 27, 41))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "plurality of undesired television channels" means within the context of the claim language and the intrinsic record.
- "digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC)" ('206 patent (claim 13, 38))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digitizing all received channels in the input signal via a wideband

analog-to-digital converter (ADC)" means within the context of the claim language and the intrinsic record.

- "digitally down converting each desired channel" ('206 patent (claim 13, 38))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digitally down converting each desired channel" means within the context of the claim language and the intrinsic record.
- "digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC)" ('206 patent (claim 25))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC)" means within the context of the claim language and the intrinsic record.
- "concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels" ('206 patent (claim 25))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels" means within the context of the claim language and the intrinsic record.
- "a contiguous band of frequencies in an input signal" ('866 patent (claim 27))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a contiguous band of frequencies in an input signal" means within the context of the claim language and the intrinsic record.
- "concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels" ('866 patent (claim 27))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "concurrently select and provide each of the plurality of desired channels

without providing any of the plurality of undesired channels" means within the context of the claim language and the intrinsic record.

- "a wideband receiver system" ('362 patent (claim 11))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "a wideband receiver system" means within the context of the claim language and the intrinsic record.
- "digital circuitry" ('362 patent (claim 11))
  - The term "digital circuitry" invokes 35 U.S.C. § 112 ¶ 6 without disclosure of sufficient corresponding structure, thereby rendering the term indefinite.
- "digital datastream" ('362 patent (claim 11))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digital datastream" means within the context of the claim language and the intrinsic record.
- "downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies…" ('362 patent (claim 11))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies…" means within the context of the claim language and the intrinsic record.
- "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels" ('362 patent (claim 11))
  - A person of ordinary skill in the art would not understand with reasonable certainty what "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels" means within the context of the claim language and the intrinsic record.

- "selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies" '362 patent (claim 11)

  - The specification and drawings of the '362 Patent do not explain what constitutes selection of channels by digital circuitry.

- "outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface" '362 patent, claim 12); "providing the plurality of digital channel outputs via a serial interface" ('866 patent , claims 13, 34, 47); "the DFE is operable to provide the plurality of desired channels via a serial interface" ('206 patent, claims 36); "the plurality of digital down converters is operable to provide each digital channel output via a serial interface" ('206 patent, claims 50)

  - The specification and drawings of the '362, '866, and '260 Patents do not describe how data what constitutes output in serial format.

III. DOCUMENT PRODUCTION ACCOMPANYING PRELIMINARY INVALIDITY CONTENTIONS

Defendants will produce, make available for inspection, or identify publicly available information sufficient to show the operation of any specifically identified aspects or elements of an Accused Instrumentality identified by Entropic in its Infringement Contentions to the extent such information is in Defendants' possession, custody, or control. Pursuant to the Court's Order Granting Claim Construction Schedule (Dkt. 117), Defendants have produced documents contemporaneous with these contentions.

Defendants are producing or making available for inspection a copy of each item of prior art identified in these contentions and the cover pleading, which does not appear in the file history of the Asserted Patents to the extent such prior art is in Defendants' possession, custody or control. Documents also produced documents contemporaneous

with these contentions: DEF_ENTROPIC_PRIOR ART 00000001 - DEF_ENTROPIC_PRIOR ART 00025916.

In addition, Comcast is producing documents marked HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY with Bates COMCAST_ENTROPIC00004696- COMCAST_ENTROPIC00004701 and COMCAST_ENTROPIC00004702-COMCAST_00004717.

Discovery is ongoing in this case, and Defendants reserve the right to rely on additional materials which may be identified and/or produced in the discovery process, including materials identified and/or produced by Entropic or third parties.

Defendants reserve the right to identify and produce additional documents pursuant to the orders of the Court.

DATED: November 20, 2023

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that all counsel of record are being served with a copy of **DEFENDANTS' PRELIMINARY INVALIDITY CONTENTIONS** via email this 20th day of November, 2023.

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